The vegetables which do come out of Afghanistan are still of comparatively good quality, which indicates that some farmers, in spite of all the obstacles, still produce excellence.

3.4 AID Projects and Vegetable Production

In all the projects working in Afghanistan and to the Afghan farmers themselves vegetables are **not** a high priority. First, the farm families have to feed themselves with staples and the projects are obliged to help the farmers to achieve that objective.

Nevertheless, some projects have made efforts to involve vegetable production in the overall agricultural recovery plan of Afghanistan. In the limited time that was available, the consultant made contact with programs that have some input in vegetable production rehabilitation in Afghanistan.

FAO Afghan Agriculture Rehabilitation Program. This project has an ongoing operation supplying vegetable seed to the NGOs working in Afghanistan. Last season, the program distributed 15 vegetables species which consisted of 27 cultivars. The rationale behind the choice of varieties is based on the FAO vegetable seed production project, Kabul recommended varieties. The NGOs in turn distribute the seed to the farming community in their area of influence.

Mercy Corps International (MCI), is based in Quetta and works in Kandahar. MCI receive vegetable seed from FAO for distribution to farmers. It is hoped that at the end of the season MCI will have assessed the quality and performance of the seeds provided to the local community.

If, at a later date, there were a vegetable seed production program in the ASSP, MCI would be interested in cooperating with that particular program.

International Rescue Committee (IRC), is based in Peshawar. The program has established a number of model farms. The farms are four jeribs in size. The units serve as a demonstration area for both arable and horticultural crops. The site is also a type of Farm Service Center where, after viewing the demonstrations, the interested visiting farmers can buy inputs that include vegetable seed and seedlings. IRC has received seed from FAO and they have also bought supplies from other sources (see Appendix IV).

The intention is to use the model farms to demonstrate to farmer groups in proximity to the demonstration farm. The individual farmer groups are, at present, in the process of being formed.

IV. TRAINING DURING THE MISSION

An intensive training course was undertaken during the last week of the three month training "marathon" for field staff. As far as possible, slides and overhead acetates were used to describe certain aspects and a field trip was undertaken to elucidate some of the classroom work.

I am indebted to Mr. Arif Noori, Mr. Qasim Yusufi, Dr. Nabi Aslamy and Mr. Abdullah Naik for providing timely translations of the various proceedings.

The course consisted of the following:

March, 1992

2
The questionnaire
Methods to improve the traditional vegetable seedling nursery
Vegetable seeds and seed testing

3
Agro-climates and the vegetable cropping calendar
Protective cropping to increase the production period of selected vegetables
How to make protective cropping structures from local materials
Pests & diseases of tomatoes, onions, garlic, brassicas, peppers and cucurbits
The use of rotations in vegetable cropping

4
Field trip to Dargai to see the Pilot Application Center of the Malakand Fruit and Vegetable Development Project. Topics discussed:

- The Use of a Demonstration Site
- Tomato Root Knot Nematode
- Walk in Plastic Tunnel Construction
- Onion Seed Production
- Onion Bulb Production
- Garlic Production

To Nowshera to see a commercial farm producing cucumbers under low plastic tunnels, specifically for the early market.

5
Crop profiles of tomato, cauliflower and carrot
Methods to reduce field heat of vegetable crops

4.1 Training Material

In conjunction with the course, the consultant left with the project, for field staff use, the following training material and aids:

- Crop profiles for tomatoes, onions, garlic, cauliflower, carrot, cucumber and okra
- The manual of ***Integrated Pest & Disease Control of Vegetables***
- Crop rotation for vegetable crops information
- Field cooling information
- How to produce carrot and onion seed information
- With the permission of the Malakand Fruit and Vegetable Development Project, a manual entitled, ***Vegetable Seedling Production***, was also left behind for training use.

Part of the material referred to above will be translated into Farsi. Some sections have already been translated to assist the field staff establish their vegetable demonstration plots.

I would like to express my gratitude to the project artist Mr. Aminullah for his assistance in producing the drawings for the training material.

Finally, the consultant left, on behalf of High Value Horticulture, a video film on horticultural marketing.

V. THE VEGETABLE DEMONSTRATIONS (SPRING/SUMMER 1992)

5.1 The Rationale

Further to the training course it was felt that a series of vegetable demonstrations should be established during this spring season throughout the project area. Bearing in mind the peak work load for the field staff is in April and May a conscious decision was made not to pressure personnel in charge of the demonstrations, the Area Extension Supervisors (AES), to commit themselves to too many demonstrations. The size of a particular demonstration was determined by the individual AES.

The basis of the demonstrations was to try to encourage farmers in the vicinity of the sites to grow vegetables and to obtain information in the field regarding the performance of the seed supplied to the field staff and the agro-climatic adaptability of the varieties chosen.

5.2 The Demonstrations

A total of 117 demonstrations (see Appendix V) are planned to be established in the 11 provinces where the project has staff. All demonstrations will be carried out on farmers' fields.

The time of sowing the seed or raising a vegetable nursery (see Appendix V) is dependent on the agro-climatic zone in which the demonstration is situated.

The total surface area of all the demonstration plots, by crop, are:

Cucumber	5.25 jeribs
Okra	2.80 jeribs
Tomato	2.10 jeribs
Carrot	8.60 jeribs
Cauliflower	3.50 jeribs

The varieties used are listed below with the rationale for the varietal choice and the purpose of the demonstration:

Cucumber - *Beth Alpha*: A varietal demonstration of a cultivar that has grows well and is widely distributed in Pakistan. *Beth Alpha* is resistant to Cucumber Mosaic Virus.

__Okra - *Parbhani Kranti*:__ A varietal demonstration , an Indian variety that is Yellow Vein Mosaic Virus resistant. Germplasm of this variety may prove worthwhile in future years as the virus mentioned is spreading across the continent.

__Tomato - *Super Heinz 1370*:__ A varietal demonstration of one of a varietal group of tomatoes that was used extensively by the Afghan farmers before the conflict.

__Cauliflower - *Snowball*:__ A varietal demonstration of this Erfurter type cauliflower that produces a white firm curd which can withstand a limited amount of summer heat and the rigors of transporting it to far away markets.

__Carrot- *Pak local*:__ A planting demonstration, instead of broadcasting the field workers will sow in lines to compare the sowing method with the local broadcasting method.

5.3 The Reporting Procedure

The amount of useful information to be gained from the demonstration will depend on the quality of the reporting. The Area Extension Supervisors (AES) have the responsibility to make sure that the extension agents fill in the report forms (see Appendix VI). A report form will have to be completed for every demonstration.

When the field staff come back to Pakistan the report forms will be discussed and analyzed in the "Post Mortem".

VI. THE FUTURE ASSP VEGETABLE COMPONENT

United States Agency for International Development (USAID) projects are finite with respect to time. Recommendations, such as this report, are made for the short term and long term. The strategies for short and long term projects are made under the following assumptions:

- Short term strategies can be implemented or have relatively quick results over a period of months and if a project is concluded, the strategies would be sustainable. The recommended development interventions, if in their infancy, could be taken over by the array of NGOs working in Afghanistan.

- Long term strategies make the assumption that AID support will continue in the near future and that the conflict in Afghanistan will eventually cease.

6.1 Recommended Strategies: Short Term

6.1.1 Human Resources

At present no vegetable resource person exists in the project. There are a number of nurserymen, who are termed horticulturists but such a connotation signifies that they usually only work with fruit crops.

The AESs and Zonal Supervisors (ZS) cannot be expected to cope with the management of all the agricultural sectors in their areas. They need guidance and support.

There is a need for the recruitment of an Afghan Vegetable Coordinator within the Agricultural Development and Training component of the ASSP/PSA project. The vegetable coordinator would manage and arrange the existing and future demonstrations respectively and translate and/or write the training material. He would also make formal contact with other Afghan country projects that have vegetable components, as well with the Pakistani vegetable research institutions.

In conjunction with the Vegetable Coordinator, it is suggested that a number of individuals (with a vegetable background) be recruited to become Vegetable Field Agents (VFA). The Vegetable Field Agents would have the task of identifying and supporting the Pilot Vegetable Extension Target Areas (See 6.1.2). The number of VFAs to be recruited will depend on project resources. It is suggested that, in the short term, no more than four VFAs should be recruited who are from and who will perform their duties in the project's major vegetable production provinces of Nangahar, Logar, Parwan, Wardak and possibly Kandahar.

Unfortunately, there is an acute shortage of competent Afghan horticulturists conversant in vegetables. The task of finding a suitable candidate may prove difficult.

6.1.2 Pilot Vegetable Extension Target Areas

The ASSP project area is vast, almost half of Afghanistan. It is impossible to cover the complete area with personnel *au fait* in vegetable production. Pilot vegetable production areas should be identified and the work output should be concentrated on such areas. All too often, with resources spread thinly, such a dilution of effort yields little results, whereas a concentration of energy pays dividends.

Pilot target areas should be identified according to the following pre-requisites:

- o The area is a traditional vegetable growing area that has been devastated during the war.
- o There are individuals/farmers in the area who have some knowledge of vegetable production.
- o The project field staff has some knowledge of vegetable production.
- o There is sufficient trust in the area for farmers to eventually constitute farmer groups.
- o NGOs that work in the area are cooperative and would be willing to take on the pilot area scheme if the project were withdrawn.
- o The area is relatively free from conflict.

6.1.3 Demonstration Plots

Demonstration plots are. an important facet of training, demonstration and extension. Vegetable production is relatively complex when dealing with more than one vegetable species. In the short term, demonstrations should therefore be kept simple and small. If the plots become complicated, the farmer begins to get perplexed by all the features of one particular demonstration and the demonstration will serve no purpose.

6.1.4 Improved Vegetable Seed

The lack of improved seed has been identified as a major constraint and can be considered the most important biotic factor that effects vegetable production.

A number of seed merchants in Peshawar order their seed direct from Royal Sluis Seed Company in the Netherlands. Every year the merchants browse through the catalog and according to farmer demand, will order that seasons seed. Delivery time will take about three months.

At present the seed merchant orders varieties that the Pakistani farmer wants: Roma tomatoes (pear shaped), Snowball cauliflowers, purple top turnips, *Beth Alpha* cucumbers. There are not many cultivar alternatives for the individual vegetable species. There needs to be some linkage between the project and the seed merchants to obtain other or a greater range of varieties that are favored by the Afghan farmers.

In the short term, it would be more expensive to order seed through a merchant than the project ordering seed direct from a seed house, but, in the long term, the process is sustainable, as the merchants will be ordering seed when the projects are long gone.

Two seed merchants that could be useful contacts are:

- o H. Nathu Khan, Old Sabzi Mandi, Peshawar. Tel 212501.

- o Malik Shad Mohammad, Zamidar Seed Store, Purani Sabzi Mandi, Peshawar. Tel. 214823 & 215913.

6.1.5 Varietal Performance

The choice of varieties in Afghanistan is based on the following:

- o Historical recommendations: What varieties were grown before the war?

- o Pakistani varietal recommendations: The varieties that are used by Pakistani farmers based on Pakistani research institution recommendations.

- o Varietal hearsay: Varieties specific to areas that have been recommended by farmers to other farmers in Afghanistan. The source of the seed is usually "farm saved."

With the above in mind, varietal recommendations based on the existing demonstrations and trials are desperately needed.

Throughout Afghanistan many projects and NGOs have laid out vegetable demonstrations. As yet very little transference of information has occurred regarding the performance of the various varieties in the respective demonstrations. The collation of all the information is important so that recommendations can be made regarding what varieties to plant, when to plant them and where.

It will the responsibility of the future vegetable coordinator to collect the varietal information from the relevant projects.

6.1.6 Onion and Carrot Seed

At present carrot and onion seed are only obtainable from local sources and are therefore produced in Pakistan. Such a seed source is of dubious quality and some farmers have had problems from using locally produced carrot and onion seed purchased in the bazaar.

It is ironic that the two crops that could be improved fairly quickly are carrots and onion. Both crops are easy to grow from seed. Onion seed can be produced by the "bulb to seed" method and carrots by the "root to seed" method. The advantage of these methods is that both crops can be inspected before planting to determine type of bulb or root required. Although the variety may not be known, the farmer can choose a uniform batch of vegetative material in order to produce seed for a uniform plant phenotype. The farmers that have difficulty obtaining seed or have encountered problems with seed bought from the bazaar should be encouraged to produce their own seed.

In conjunction with seed production, in the short term, the AESs are recommended to participate in a vegetable seed course of two weeks at the Vegetable Seed Farm, Quetta. The timing of the course would coincide with their fruit tree training in Quetta.

6.1.7 The Second Part of the Consultancy

It is recommended that the second part of this consultancy should be start at the beginning of August to coincide with the AES training period in Quetta.

The timing would be conducive for the preparation of the second series of demonstration plots in the warmer areas. The demonstrations would involve onion production, improved garlic production, some winter vegetable work and onion seed production.

Furthermore, the AESs should by August have in their possession the preliminary results of the Spring/Summer demonstrations. The consultant can therefore analyze the results to gage the success of the program.

6.1.8 Inputs and Equipment Procurement

At present, very little is needed with respect to equipment. During the training it was evident that for crop inspections the field staff should have in their possession a small pocket knife (not expensive budding knives), a hand lens (x 10 magnification) and a garden trowel. Bearing in mind the agro-climatic diversity, the individual AESs should be issued altimeters, to give them indications of height and agro-climatic zone.

With respect to inputs there is a case for the importation of two French garlic varieties, one broad leaf variety e.g *Blanc de la Drome* and one narrow leaf variety e.g. *Fructidor.* The quantity should be 500 kg of each variety.

The consultant would also like to purchase and hand carry to Pakistan a quantity of carrot and tomato varieties (Heinz group) that are grown in the extreme climatic areas of Mexico. The quantities should be 600 gm of tomato and 3 kg of carrot.

There is a variety of cauliflower that is said to be a hot weather cultivar which has been bred in Taiwan. It is called *Farmers Extra Early Cauliflower*. (From Known You Seed Company Ltd, 26, Ching Cheng 2nd Rd, Kaoh Suing, Taiwan. Fax.07 291 9106). It would be useful to evaluate this variety in the hotter agro-climates in Afghanistan. A small quantity of seed (100 gm) would be sufficient.

All the above varieties recommended should be in the country for the consultant's return so they can be utilized in the Autumn/Winter training and demonstration program.

Assistance in the location and procurement of the above mentioned items will be given by High Value Horticulture.

I. INTRODUCTION

The present visit to Pakistan is the first part of a two part consultancy within the AASSP/PSA, under a program termed the Horticultural Training and Demonstration Program (HTDP). The subcontract of HTDP is implemented by High Value Horticulture (HVH).

The purpose of HTDP is to complement the other agricultural components of the ASSP, with an effective horticultural sector. By increasing the horticultural technical knowledge of field staff and by improving their ability to demonstrate fruit and vegetable crops as well as the improved agronomic practices that go with such production regimes, AASSP will be strengthened.

6.2 Recommended Strategies: Long Term

6.2.1 Staffing

As already mentioned, vegetable production when dealing with more than one species can be complex. It is not only the agronomic practices that are intricate but the difficulty of such practices in separate agro-climatic zones.

In the long term, it is recommended that two Afghan Vegetable Coordinators/ Subject Matter Specialists (SMS) be recruited for two distinct regions, one person for the highland area and one for the lowland area. The SMS Highland would be based in Peshawar and the SMS Lowland would be based in Quetta.

6.2.2 Low Input Vegetable Production

At present, many farmers are forced into low input vegetable production because of the non-availability of inputs. Low input vegetable production is no bad thing. The farmer has to use alternative methods of crop production and crop protection, which if managed correctly can be more environmentally sound than the methods traditionally practiced in developing countries.

If after the conflict, the shortfall of input supplies eases, farmers should still be encouraged to continue with low input horticulture, but the development approach should be to encourage a sustainable production system. In the long run the stability of the farming system will be sound. In the short term such systems are difficult to manage and monitor.

Low input horticulture entails inspecting the crop frequently.

A farmer should continue to use soapy water to reduce aphids on cabbage or flood beds to "drown" nematodes. Also very important is that farmers must continue to use, wherever possible FYM as the nutrient source for vegetables and they must start to learn to make compost.

6.2.3 Integrated Pest Management

As previously stated, low input horticulture should continue to be encouraged even when, in future, inputs are in abundance. An abundance of pesticides means the development of resistance by pests to certain chemicals, insects that were not pests suddenly becoming so, pesticides used that are harmful to the environment and, probably worst of all, the natural balance of pest and predator relationships being disturbed.

A great deal of work has been carried out in Pakistan, by the International Institute of Biological Control (IIBC) studying the natural enemies of prevalent pest species. In fact many natural enemies do exist in the environment. There is no reason why such natural enemies don't exist in Afghanistan. At some point work needs to be carried out to identify the parasitiods and predators and determine life cycles of individual pest species. In the long term, the IIBC should be subcontracted to carry out such work.

The IIBC could be involved in short training courses on biological control, training the AESs on how to assess the economic thresholds of pest populations and how to examine individual crops for pests and predators.

An example of the institutes work is given in Appendix VII.

6.2.4 Women in Vegetable Production

The women in the household play a role in vegetable production, especially in the household or compound garden. Women are often used for tedious and meticulous jobs such as weeding and harvesting and are the ones who usually save the seed for the following year's crop of vegetables. There is therefore an inherent expertise amongst the female section of the household.

In an ideal situation, women could be recruited and trained as Lady Field Assistants to gain access to the households and to promote vegetable gardening. Unfortunately, due to cultural/religious restrictions, a Lady Field Assistant program is not feasible. The difficulty is reaching the women for training in improved methods of vegetable production.

At present most of the women in the eastern provinces of Afghanistan are in refugee camps. The project should concentrate on the refugee camps and not Afghanistan. Therefore, when repatriation occurs there is a nucleus of trained female vegetable growers.

The first priority is to make contact with the camp's Social Welfare Committees to seek permission for the training of the women in vegetable production. The training can be implemented in two ways:

- o Train the menfolk of the household who will then pass on the training to the females.

- o Recruit or subcontract Pakistani Lady Field Assistants. The Fruit & Vegetable Development Board of North West Frontier Province (NWFP) has many Lady Field Assistants working in NWFP. The Lady Field Assistants would then train the women in the camps directly without a male intermediary.

Usually in the household women are the financial controllers of the family. The females will adopt household gardening only if it can be shown conclusively that there is money to be made. The women making money in their own right will raise their self esteem within the family group.

6.2.5 Extension and Farmer Groups

The project field staff is quite finely spread. When the refugees return, the staff will be overloaded with work. In areas where villages are cooperative it would be recommended to inquire about the possibility of forming farmer groups.

With respect to vegetables the village would nominate an individual to be trained in vegetable production, storage and marketing techniques and convey such training to his group members.

In return, the farmer extensionist would receive inputs and equipment to distribute among his group. By this method the following is achieved:

- o Village extension at household level.
- o Material in the form of inputs and equipment is provided in kind but is regarded as payment for the time that the extensionist attended at the training sessions.
- o In times of food shortages, the villages with extensionists would have vegetables and possess the knowledge to store them.

6.2.6 Food Shortages

At times and in some provinces food shortages can occur. In the project areas light food shortages were reported in Parwan, Wardak, Ghazni and Kandahar. Moderate food shortages were reported in Bamyan.

Vegetables in conjunction with staples (pulses and cereals) can alleviate nutritional deficiencies. Two ways to improve the food situation are through the farmer extensionist being provided with vegetable seed for the production of

vegetable crops for the households and, secondly, for the provision of training for the extensionist in the storage of root crops and the drying of crops such as onion, okra and tomato.

6.2.7 Overseas Training

In the long term, once an Afghan vegetable coordinator or coordinators are recruited, it is recommended that if the officer shows promise, he should be recommended for overseas training. Unfortunately, the majority of courses in Europe and the United States are technically oriented with production techniques which may be too advanced and inappropriate for Afghan vegetable production.

The Asian Vegetable Research and Development Center has a regional training center at the University of Kasetsart, Thailand. The center provides training for dry hot weather vegetable production which could be relevant to Afghan conditions. It is recommended that the future coordinators be sent there.

APPENDIX 1

ITINERARY

February, 1992

23	Depart Mexico
24	Arrive UK, High Value Horticulture briefing
25	HVH Briefing
26	HVH Briefing
27	Depart Gatwick
28	Arrive Pakistan Briefing with Don Oelsligle, Advisor ADT
29	Discussions with Dr. Wakil & Don Oelsligle

March, 1992

1	Discussions with Richard Smith, Chief of Party ASSP/PSA Meeting Fred Smith, USAID Travel to Swat
2	Malakand Fruit & Vegetable Development Project (MFVDP), Saidu Sharif, to collect training material Training, Peshawar
3	Training, Peshawar Training, Peshawar
4	Field trip to Dargai, Malakand Agency Field trip to Nowshera
5	Training, Peshawar Vegetable Seed Survey, Peshawar markets
6	Travel to Swat

March, 1992

7	Abdul Majid, Vegetable Botanist, North Mingora Research Station Inspection of the ASSP/DAI Nursery and Orchard Madyan, Upper Swat Malam Pilot Application Center of MFVDP Zareen Nursery Magahlor, Swat
8	Discussions with CTA (Ian Gibson), Horticulturist (Tony Portman), MFVDP Travel to Peshawar
9	Wahid Ullah, Vegetable Research Officer, Turnab Pordel Khan, Vegetable Botanist, Turnab Writing Crop notes for field staff
10	Pre-testing crop notes in AES meeting Crop note revision
11	Compiling questionnaire results Purchase of vegetable seed
12	Seed distribution to the AESs Mr. A Pryce, CTA, UNDCP, Afghan Rehabilitation and Reconstruction Project
13	Travel to Islamabad
14	Dr.Ikram Moyuddin, Station I/C, International Institute of Biological Control Mohammad Hussain Bhatti, SSO, NARC Vegetable Program Office Pest and Disease booklet writing
15	Questionnaire D Base work Anthony Fitzherbert, Program Coordinator, Afghan Agricultural Rehabilitation Program, FAO
16	Dr. Gary Lewis, Chief Agricultural Development Officer, USAID Mr. Myron Jespersen, Mercy Corps International

17	Discuss drawings for training notes Travel to Peshawar
18	Discussions with AESs, training notes revision Mr. Bob Bouvier, International Rescue Committee Mr. I. Gibson, CTA, MFVDP Mr. S. Young, Ag Econ, MFVDP Mr. H. Ambuel, Dev Con, Swiss Embassy Dr. M. Wieser, Inter-cooperation, Switzerland
19	Travel to Islamabad Final discussions with Dr. Cartwright
21	Mr. R. Eberlin, Farming Systems Economist, Pak\Swiss Potato Development Project Report writing
23	Report writing
24	Report writing & training notes preparation
25	Data work & report writing Dr. Gary Lewis, AID/Rep, report presentation
26	Finalization of documentation
27	Depart Pakistan and debriefing on March 30, 1992.

APPENDIX II

FIELD STAFF QUESTIONNAIRE

(If the replies to the questions are in **bold** please circle the most suitable answer or answers)

Province:

Town:

Have you grown vegetables, if so which types?

Vegetable Production In Your Area:

Tick which vegetable species are grown in your area and list any varieties of the vegetables grown against the name:

Onion-

Garlic-

Peas-

Beans-

Palak-

Carrot-

Cauliflower-

Cabbage-

Tomato-

Which months are the particular vegetables sown or transplanted out?

January-

February-

March-

April-

May-

June-

July-

August-

September-

October-

November-

December-

Are vegetables usually grown alone or used in an intercrop within the orchard?
Alone **Intercrop** **Both**

Are there specialist vegetable growers in your area? **Yes No**

Are most vegetables grown after a cereal crop? **Most Some No**

What market/s are they grown for?

Local/Village Provincial town Kabul Export

What fertilizers are used?

Urea Ammonium Sulphate

DAP SSP

Potassium sulphate. Compound e.g. 10.20.20. 15.15.15

Any others--

When are the fertilizers applied? Please refer to individual vegetable crops.

What pesticides are used and for what pest and on what vegetable crop?

If any, what are the methods of storing vegetables?

What do you consider as the production constraints to the farmer?

Where do farmers get information regarding vegetable production techniques?

No information **From other farmers** **Extension personnel**

From literature(papers/books etc.) **From the radio**

In your opinion do farmers in your area adopt new techniques?

Yes **No**

If no why?

II. THE CONSULTANCY

The consultant arrived in Pakistan on February 28, 1992 after a three day briefing in the United Kingdom. At the same time the Deciduous Fruits Consultant, Mr. Jim Cartwright, arrived in Pakistan. It was decided that this consultant should, wherever possible, concentrate on vegetable crops, in the light of Mr. Cartwright being in country.

2.1 Terms Of Reference

In brief, the terms of reference for this particular consultancy were as follows:

* Present lectures and training materials on various aspects of vegetable production that would be relevant to small farmers in Afghanistan.
* Implement and coordinate a vegetable demonstration program within the ASSP project area.
* Manage and arrange the supply of inputs and plant material for the demonstration areas.
* Make recommendations for the vegetable demonstration and extension component within the project.
* Advise on the need to procure improved plant material, horticultural inputs and tools/machinery that may be necessary to enhance the capability of the vegetable production program within the program.
* In coordination with the deciduous fruit consultant, assist that particular program.
* Appraise what other horticultural activities are ongoing that may be relevant to vegetable production in Afghanistan.

The itinerary to achieve the above terms of reference is seen in Appendix I.

At this juncture it is worth noting that the main thrust in this particular consultancy was the training of field staff, the preparation of training material and the implementation of the vegetable demonstration program.

APPENDIX III

COMPILATION OF VEGETABLE QUESTIONNAIRE DATA

FIELD	CODES	ITEM
1. MARKETING		
	1	LOCAL
	2	PROVINCIAL
	3	TOWN
	4	KABUL
	5	EXPORT
2. FERTILIZER		
	1	UREA
	2	AMMONIUM SULPHATE
	3	DAP
	4	SSP
	5	POTASSIUM SULPHATE
	6	COMPOUND FERTILIZER
	7	MANURE
3. CONSTRAINTS		
	1	NO MARKET
	2	NO STORAGE
	3	LACK OF TRANSPORTATION
	4	LACK OF IMPROVED SEEDS
	5	LACK OF FERTILIZER
	6	LACK OF PESTICIDE
	7	NO NEW TECHNOLOGY
	8	INSUFFICIENT WATER
4. INF SOURCE		
	1	NO INFORMATION
	2	FROM OTHER FARMERS
	3	EXTENSION PERSONNEL
	4	FROM LITERATURE
	5	FROM THE RADIO

Record#	province	district	onion	garlic	peas	beans	palak	carrot	caul	cabb	tomato	pumpkin	okra
1	WARDAK	CHAK	.T.	.T.	.F.	.T.	.T.	.T.	.T.	.T.	.T.	.F.	.F.
2	HELMAND	SHAMALAN	.T.	.F.	.F.	.T.	.T.	.T.	.F.	.F.	.T.	.T.	.T.
3	KANDAHAR	KHAJAMULK,PANJWAI	.T.	.F.	.F.	.F.	.T.	.F.	.F.	.F.	.T.	.F.	.T.
4	KANDAHAR	ARGHANDAB	.T.	.T.	.T.	.T.	.T.	.T.	.F.	.F.	.T.	.F.	.F.
5	KANDAHAR	LOYKOREZ	.T.	.F.	.F.	.F.	.F.	.T.	.F.	.F.	.F.	.F.	.T.
6	PAKTIKA	SHARAN	.T.	.F.	.F.	.T.	.F.	.F.	.F.	.F.	.T.	.F.	.F.
7	PAKTIA	KOLALGO	.T.	.F.	.F.	.T.	.F.	.F.	.F.	.F.	.T.	.F.	.F.
8	LOGAR	CHARKH	.T.	.T.	.F.	.T.	.T.	.T.	.F.	.F.	.T.	.F.	.F.
9	WARDAK	SAIDABAD	.T.	.F.	.F.	.F.	.T.	.T.	.F.	.F.	.T.	.F.	.F.
10	GHAZNI		.T.	.F.	.F.	.F.	.T.	.T.	.F.	.F.	.T.	.F.	.F.
11	TAKHAR	TALOQAN	.T.	.F.	.F.	.F.	.T.	.T.	.F.	.F.	.T.	.F.	.F.
12	PARWAN	GHURBAND	.T.	.F.	.F.	.T.	.F.	.T.	.F.	.F.	.T.	.F.	.F.
13	NINGARHAR	DARANOOR	.T.	.T.	.F.	.T.	.F.	.F.	.F.	.F.	.T.	.F.	.T.
14	BAGHLAN	BAGHLAN	.T.	.T.	.T.	.T.	.T.	.T.	.F.	.F.	.T.	.F.	.T.
15	BAMYAN	BAMYAN	.T.	.F.	.F.	.F.	.F.	.T.	.T.	.F.	.T.	.F.	.F.
16	KABUL	CHARASYAB	.T.	.T.	.F.	.F.	.F.	.T.	.F.	.F.	.T.	.F.	.T.
17	GHAZNI	QARABAGH	.T.	.F.	.F.	.F.	.F.	.T.	.F.	.F.	.T.	.F.	.F.
18	PAKTIA	KOLALGO	.T.	.T.	.F.	.F.	.F.	.T.	.F.	.F.	.T.	.F.	.F.
19	KABUL	WALOSWALI	.T.	.T.	.T.	.T.	.F.	.F.	.F.	.F.	.T.	.F.	.F.
20	KANDAHAR	ARGHANDAB	.T.	.T.	.T.	.F.	.F.	.F.	.F.	.F.	.T.	.F.	.F.
21	WARDAK	CHAK	.T.	.F.	.T.	.F.	.F.	.F.	.T.	.T.	.T.	.F.	.F.
22	BAMYAN	CENTER BAMYAN	.T.	.T.	.F.	.F.	.F.	.F.	.F.	.T.	.T.	.F.	.T.
23	KABUL	KABUL	.T.	.F.	.F.	.F.	.F.	.F.	.T.	.F.	.T.	.F.	.F.
24	WARDAK	BALLAL KHEL	.T.	.T.	.T.	.T.	.F.	.F.	.F.	.F.	.T.	.F.	.T.
25	PARWAN	GHURBAND	.F.	.F.	.F.	.F.	.F.	.T.	.F.	.F.	.T.	.F.	.F.
26	WARDAK	SAIDABAD	.T.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.T.	.F.	.F.
27	WARDAK	JAGHATU	.F.	.F.	.F.	.F.	.T.	.F.	.F.	.F.	.T.	.F.	.F.
28	LOGAR	MOHAMMAD AGHA	.T.	.T.	.F.	.F.	.T.	.F.	.F.	.F.	.T.	.F.	.F.
29	LOGAR	BARAKIBARAK	.T.	.F.	.F.	.F.	.T.	.F.	.F.	.F.	.T.	.F.	.F.
30	LOGAR	ZARGUNSHAR	.T.	.F.	.F.	.F.	.T.	.T.	.F.	.F.	.T.	.F.	.F.
31	LOGAR	MOHAMMAD AGHA	.T.	.T.	.F.	.F.	.F.	.F.	.F.	.F.	.T.	.F.	.F.
32	LOGAR	BARAKIBARAK	.T.	.T.	.F.	.F.	.F.	.F.	.F.	.F.	.T.	.F.	.F.
33	LOGAR	KOLANGAR	.F.	.T.	.T.	.F.	.F.	.F.	.F.	.F.	.T.	.T.	.F.
34	LOGAR	BARAKIBARAK	.T.	.T.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.
35	LOGAR	PUL ALAM	.T.	.F.	.F.	.F.	.F.	.T.	.F.	.F.	.T.	.F.	.T.
36	LOGAR	CHAK	.T.	.T.	.F.	.F.	.F.	.F.	.T.	.T.	.T.	.T.	.F.
37	LOGAR	BARAKIBARAK	.T.	.F.	.F.	.F.	.T.	.F.	.F.	.F.	.T.	.F.	.F.
38	GHAZNI	CENTER	.T.	.T.	.F.	.F.	.F.	.F.	.F.	.F.	.T.	.F.	.F.
39	GHAZNI	ANDER	.T.	.F.	.F.	.F.	.T.	.F.	.F.	.F.	.T.	.F.	.F.
40	KANDAHAR	PANJWAI	.F.	.F.	.F.	.F.	.T.	.F.	.F.	.F.	.T.	.F.	.F.
41	KANDAHAR	PANJWAI	.T.	.F.	.F.	.F.	.T.	.F.	.F.	.F.	.T.	.F.	.F.
42	HELMAND	DARWESHAN	.T.	.F.	.F.	.F.	.F.	.F.	.T.	.F.	.T.	.F.	.T.
43	HELMAND	DARWSHAN	.T.	.F.	.F.	.F.	.T.	.F.	.F.	.F.	.T.	.T.	.T.
44	HELMAND	SHAMALAN	.T.	.F.	.F.	.T.	.F.	.F.	.F.	.F.	.T.	.F.	.T.
45	PAKTIKA	SHARAN	.T.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.T.	.F.	.F.
46	PAKTIKA	SHARANA	.T.	.F.	.F.	.F.	.T.	.F.	.F.	.F.	.T.	.F.	.F.
47	KABUL	CHARDI	.F.	.T.	.F.	.F.	.T.	.F.	.F.	.F.	.T.	.F.	.F.
48	NINGARHAR	DARANOOR	.T.	.T.	.F.	.F.	.T.	.F.	.F.	.F.	.T.	.F.	.T.
49	WARDAK	CHAK	.T.	.F.	.T.	.T.	.F.	.F.	.T.	.T.	.T.	.F.	.F.
50	PARWAN	GHURBAND	.T.	.F.	.F.	.T.	.T.	.F.	.F.	.F.	.T.	.F.	.F.
51	GHAZNI	JAGHATU	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.
52	NINGARHAR	SURKHROAD	.T.	.F.	.F.	.F.	.T.	.F.	.T.	.F.	.F.	.F.	.T.
53	HELMAND	SHAMALAN	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.T.
54	BAGHLAN	PUL KHUMRI	.T.	.F.	.F.	.F.	.T.	.T.	.F.	.F.	.T.	.T.	.T.
55	URUZGAN	DEHRAWOOD	.T.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.T.	.F.	.T.
56	GHAZNI	JAGHATU	.T.	.F.	.T.	.F.	.F.	.F.	.F.	.F.	.T.	.F.	.F.
57	KANDAHAR	PANJWAI	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.	.F.
58	WARDAK	CHAK	.F.	.F.	.F.	.F.	.F.	.F.	.T.	.T.	.F.	.F.	.F.

Record#	croping	specialist	aftr_cerea	marketing	fertilizer	pesticide	storage	constraint	inf_source	tech_adopt
1	BOTH	.F.	NO	2	7	.T.		2,1,3	3,4	.T.
2	BOTH	.F.	SOME	2,2	7	.T.		1,2,3	2,3,5	.T.
3	ALONE	.T.	SOME	1,2	1,3,4	.F.		1,2,3	2,3	.T.
4	BOTH	.T.	SOME	1,2	7	.T.		1,2,3	2,3,5	.T.
5	BOTH	.F.	SOME		1,2	.F.		1,2	2,4	.T.
6	ALONE	.F.	NO	1,2	1	.F.	LOCAL METHOD	4,6,2,1	2,3	.F.
7	ALONE	.F.	NO	1,2	1	.F.	LOCAL METHOD	4,6,2,1	2,3	.F.
8	BOTH	.F.	NO	1,2,4	1,3,7	.F.			2,3	.T.
9	ALONE	.T.	SOME	1,2,4	1,3	.F.		4,1,	2,3	.F.
10	BOTH	.F.	NO	1,2,4	7	.F.	LOCAL METHOD	4,5,6,7	2,3	.T.
11	ALONE	.T.	NO	1,2	1,3	.F.	LOCAL METHOD	1,2,3	1,2	.T.
12	ALONE	.F.	SOME	1,2,4	1,3,7	.F.	LOCAL METHOD	1,2,3	12	.T.
13	BOTH	.F.		1	1,3	.F.		1,2,3	2,3	.T.
14	ALONE	.F.	SOME	1,2	1,3	.F.		1,2,3	2	.T.
15	ALONE	.F.	NO	1,2,3	1,3,7	.F.	LOCAL METHOD	1,2,3	1	.T.
16	INTERCROP	.T.	MOST	1,2,4	1	.T.	LOCAL METHOD		3	.T.
17	BOTH	.T.	SOME	1,2,4	7,	.F.	LOCAL METHOD	4,5,7	2,3	.T.
18	ALONE	.F.	MOST	1,2		.F.		1,2,5,6	2,3	.T.
19	INTERCROP	.T.		1,2	7	.T.		4,5,6	2,3	.T.
20	BOTH	.T.	SOME	1	1	.F.		4	2,3	.T.
21	ALONE	.F.		1,2	1,37	.T.		4,5	2,3	.T.
22	INTERCROP	.T.	SOME	1	1,7	.F.	LOCAL METHOD	4,5,	1,3	.T.
23	INTERCROP	.F.		1,4	1,7	.F.		1,4,8,	3,4	.T.
24	ALONE	.F.		1,2		.F.		4,5	1	.F.
25	INTERCROP	.T.	SOME	1,2	1,7	.F.	LOCAL METHOD	4,5,6	1	.T.
26		.F.			1,7	.F.	LOCAL METHOD	4,5,7	2	.T.
27	BOTH	.T.	NO	1	1	.F.	LCOAL METHOD	4,5,	2	.T.
28	ALONE	.T.	SOME	1,2,4	1,3,7	.T.	LOCAL METHOD	4	2,3	.T.
29	ALONE	.T.	SOME	1	1,3,	.T.	LOCAL METHOD	4,5,6,8	3	.T.
30	ALONE	.F.	NO	1	7	.F.		4,5,6,8	1	.T.
31	INTERCROP	.F.	SOME	1,2	1,7	.F.	LOCAL METHOD	2,4,5	2,3,4	.T.
32	ALONE	.T.	SOME	1,2	1	.F.	LOCAL METHOD	1,3,4,5	23	.T.
33	INTERCROP	.T.	SOME	1,2,4	7	.F.	LOCAL METHOD	3,4	1	.T.
34	INTERCROP	.T.	SOME	1,2	1,3,7	.T.		1,4,6	1,2,3	.T.
35	BOTH	.T.		1,2		.F.	LOCAL METHOD	4,5,6	1,2	.T.
36	BOTH	.T.	SOME	1,2,5		.F.	LOCAL METHOD	4,5,6		.T.
37	BOTH	.T.	SOME	1,2,4		.T.	LOCAL METHOD	1,5,8	3	.T.
38		.F.		1,2	1,7	.F.		4,5	1	.T.
39		.F.		1	7	.T.	LOCAL METHOD	2,4,5,8	2,3	.F.
40		.T.		1,2	1	.T.		4,5,6,7,	1,2,3	.T.
41	ALONE	.T.	SOME	1	1	.T.	LOCAL METHOD	4,6,1	1	.T.
42		.F.		1,2	1,7	.T.		4,5.6	1,3	.T.
43		.T.	SOME	1	1	.F.		4,5,7	1,3	.T.
44		.F.		1		.F.	LOCAL METHOD	4,5	1,3	.T.
45	ALONE	.F.	NO	1	1	.F.	LOCAL METHOD	5	3	.T.
46		.F.		1		.F.	LOCAL METHOD	4,8		.F.
47		.F.	MOST	1,2		.T.	LOCAL METHOD	2,4,8	3,5	.T.
48		.F.		1 /		.T.	LOCAL MEHTOD	1,4,5,6	2,3	.T.
49		.F.		1,2,5	1,3	.T.	LOCAL METHOD	4,5,6	1	.T.
50	BOTH	.F.		1	1	.F.	LOCAL METHOD	4,5	1,3	.T.
51		.F.	SOME	1		.F.	LOCAL METHOD	1,5,		.T.
52		.F.		2,4		.F.		2,4,5	1,3	.T.
53	ALONE	.F.		1,2	1	.F.		4	2,3	.T.
54	ALONE	.T.	SOME	1,2	1	.F.	LOCAL METHOD	4,5	1,3	.T.
55		.T.	SOME	1,2	1,3	.T.	LOCAL METHOD	4,5,	2	.T.
56	ALONE	.T.	NO	1,2		.F.	LOCAL METHOD	4,5	1	.F.
57		.F.		1,2,5		.F.		4	1	.T.
58	BOTH	.T.	SOME	1,2	1	.F.	LOCAL METHOD	4,5,7	1,2,3	.T.

Tlx. : 52448 IRC PE PK
Tel. : 43350 - 43360 - 41350



International Rescue Committee
G.P.O. 504, PESHAWAR - PAKISTAN

List of vegetable seed purchased for Seedlings production and Demonstration

No	Type and Name of Vege- Seeds	No. of Small Box	weight of Box ingram	Total weight gram or Killogram	
1	Tomato Roma V:F Bonanza U.S.A	6	200	1200 gram	
2	Tomato Roma V.F Techinsem France	2	200	400 gram	
3	Tomato Roma V.F Popperien Haland	6	200	1200 gr	
4	Tomato N.S.C Pakistan	6	100	600 gr	
5	Cucumber Hybrid Bonanza U.S.A	3	200	600 gr	
6	Egg plant long size Tiwan	2	200	400 gr	
7	Egg plant Siam seed India	2	200	400 gr	
8	Egg plant Pahuja of India	2.	200	400 gr	
9	Egg plant with out Boxes			5 Kg	
10	Red Radish (Radish Sixa) Bonanza U.S.A	3	400	1200 gr	
11	Red Radish Pakistani	1	400	400 gr	
12	White Radish Tiwan	4	200	800 gr	
13	White Radish (Rabano) Japan	1	400	400 gr	
14	CR-103 Radish Tiwan	1	400	400 gr	
15	pepper special seed pakistani	5	100	500 gr	
16	Pepper India	1	400	400 gr	
17	Pepper India	1	200	200 gr	
18	Pepper with out Boxes	0	0	6 Kg	
19	Water Melon with out Boxes	0	0	2 Kg	
20	Melon (Mankera) Pakistani	1	400	400gr	
21	Okra Indian (Problani Kranti)	2	5kg	10 Kg	
22	Okra Indian (Pusa Sawani)	1	5kg	5 Kg	

APPENDIX IV

Tlx. : 52448 IRC PE PK
Tel. : 43350 - 43360 - 41350

IRC FOUNDED 1933

International Rescue Committee

G.P.O. 504, PESHAWAR - PAKISTAN

	Type and name of veg. seeds	No. of small Box	W. of Box in gm	Total W. in gm/kg	
3	Okra No#II Banu			4 kg	
4	Spinatch No#1 pakistani			6 kg	
5	Pumpkin long size Indian			1 kg	
6	Squash standard seed (Semenars semeti)	4	100	400 gms	
7	Tenda pakistani			1 kg	
8	Carrots for plane area			2 kg	
9	Carrots for Mountainous area			2 kg	
10	Leek			3 kg	

VEGETABLE DEMONSTRATION PROGRAM - SPRING/SUMMER 1992

Province	Vegetable type	No of Demos	Each Demo Area (jerib)
Nangarhar	Cucumber	4	0.10
	Okra	2	0.10
Helmand	Cucumber	6	0.25
	Okra	5	0.05
Kandahar			
Maroof District	Cucumber	6	0.10
	Okra	6	0.10
	Tomato	6	0.10
Punjwaei District	Cucumber	4	0.25
	Okra	3	0.25
	Tomato	3	0.25
Khawaja Mulk District	Cucumber	3	0.25
	Okra	3	0.25
	Tomato	3	0.25
Ghazni	Cauliflower	4	0.10
	Carrot	12	0.25
Paktika	Carrot	3	0.25
	Cauliflower	3	0.05
Logar	Carrot	10	0.25
	Cauliflower	5	0.10
Wardak	Carrot	4	0.25
	Cauliflower	4	0.50
Bamyan	Carrot	2	0.05
	Cauliflower	2	0.10
Parwan	Cucumber	2	0.25

	Carrot	2	0.25
	Cauliflower	1	0.10
Takhar	Cucumber	1	0.10
	Carrot	1	0.25
	Cauliflower	1	0.05
Baghlan	Cucumber	2	0.10
	Carrot	2	0.25
	Cauliflower	2	0.05
TOTAL		117	

Vegetable Crop Total Demonstration Areas

Cucumber	5.25 jeribs
Okra	2.80 jeribs
Tomato	2.10 jeribs
Carrot	8.60 jeribs
Cauliflower	3.50 jeribs
Total	22.25 jeribs

Seed Requirement and Variety

Beth Alpha, Cucumber	314 gm
Parbhani Kranti, Okra	8.4 kg
Super Heinz 1370, Tomato	63 gm
Pak Local, Carrot	8.6 kg
Snowball, Cauliflower	87.50 gm

APPENDIX V

Seed Requirements Per Province

Province	Quantity	Unit	Crop
Nangarhar	24	gm	cucumber
	600	gm	okra
Helmand	60	gm	cucumber
	750	gm	okra
Kandahar (Maroof District)	36	gm	cucumber
	1,800	gm	okra
	18	gm	tomato
Kandahar (Punjwaei District)	60	gm	cucumber
	2,250		okra
	22.5	gm	tomato
Kandahar (Khawaja Mulk District)	45	gm	cucumber
	2,250	gm	okra
	22.5	gm	tomato
Ghazni	10	gm	cauliflower
	3	kg	carrot
Paktika	750	gm	carrot
	3.75	gm	cauliflower
Logar	2.5	kg	carrot
	12.5	gm	cauliflower
Wardak	1	kg	carrot
	25	gm	cauliflower
Bamyan	100	gm	carrot
	5	gm	carrot
Parwan	30	gm	cucumber
	500	gm	carrot
	2.5	gm	cauliflower

APPENDIX V

Takhar	6	gm	cucumber
	250	gm	carrot
	1.25	gm	cauliflower
Baghlan	12	gm	cucumber
	500	gm	carrot
	2.5		cauliflower

DEMONSTRATION REPORT SHEET

NAME: اسم:

PROVINCE: ولايت:

DISTRICT: ولسوالي:

TOWN/VILLAGE: قريه:

CROP: نبات:
VARIETY: جنس و نوع:
SOIL TYPE: نوع خاك (حاصل خيز سخت وغيره):
(heavy,light, rich, etc.)
SEEDS RAISED OR DIRECT SOWN: تخم مستقيماً در زمين بذر شده يا
به شكل نيال رونيده است:
PLANTING DATE: تاريخ بذر:
WEATHER AT TIME OF PLANTING: آب و هوا در وقت كشت: (سرد،آفتابي،
(cold, sunny, rain, etc.) باراني وغيره)
PRE-PLANTING FERTILIZER/MANURE TREATMENT: استعمال كودو كود
حيواني قبل از كشت:
DATES OF WEEDING: تاريخ كنترول گياه هرزه:
FERTILIZER TOP DRESSING AND RATES: مقدار و استعمال كود
بالاي نبات بعد از كشت:
PESTICIDE APPLICATION WITH RATES: استعمال دواي
ضد آفات و مقدار آن:
IRRIGATION DATES OF APPLICATION: آبياري و تاريخ بكار
بردن آب:
SPECIAL TREATMENTS: تداوي و كار هاي از قبيل استعمال گياه كش،
(herbicides, tying, stopping,training, etc.) بستة كردن،توقف دادن وغيره:
HARVEST DATE: تاريخ برداشت حاصل:
YIELD/PROFIT: حاصل و مفاد:
PROBLEMS ENCOUNTERED: مشكلات كه به آن روبرو شده ايد:
FARMER COMMENTS: پشنهاد و نظرية دهقان:

Pakistan J. Agtic. Res., Vol.5, No.3, 1984

EXAMPLE OF IIBC WORK

PIERIS BRASSICAE--(PIERIDAE:LEPIDOPTERA), A PEST OF CRUCIFERS AND ITS CONTROL BY PARASITES[1]

M.Mushtaque[2] and A.I.Mohyuddin[3]

ABSTRACT: *Pieris brassicae* (L.) causes heavy losses to cabbage and cauliflower crops in many parts of Pakistan. Major pest damage occurs at the time of crop harvesting, when application of pesticide is not advisable. In the present work the feasibility of controlling *P. brassicae* through augmentation of populations of its parasites, *Diadegma pierisac* (Rao) and *Pteromalus puparum* (L.), was investigated. Highly positive results were obtained.

Key Words: Cruciferae;Pests;ControlMethods,Parasites;Biology;Crop Losses:Pakistan.

INTRODUCTION

Pieris brassicae (L.) commonly known as large cabbage butterfly, is one of the most serious pests of cruciferous crops in many parts of the world. According to Edwards and Heath (1964), *P. brassicae* is common all over Europe, North Africa and Asia. Ghori (1960) reported it as a major pest of cabbage and cauliflower in Pakistan. These studies were made on distribution, phenology, host plants and natural enemies of this pest in Pakistan. In particular, the effect of redistribution of *Diadegma pierisae* (RAO) and augmentation of *Pteromalus puparum* (L), both important endemic parasites of the pest was studied.

MATERIALS AND METHODS

Representative localities in different ecological zones of Pakistan were surveyed to determine distribution of *P. brassicae*. Immature stages of the pest were collected from various plants and reared in the laboratory to adult or parasite stage.

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1 This research was conducted under a PL-480 project (FG-Pa-273/PK-ARS-90)

2 Pakistan Agricultural Research Council, Islamabad

3 Commonwealth Institute of Biological Control, Rawalpindi

It was also envisaged that, in order not to complicate the training and demonstrations and to strike a reasonable balance, the number of vegetable crops studied should be kept to a minimum.

In order of importance, the basis of the preference selection was threefold:

- o the economic importance of species;
- o their distribution in Afghanistan; and
- o their direct contribution to the nutrition of the population.

The crops selected were cauliflower, tomato, carrot, garlic and onion. As the training evolved it became apparent that okra and cucumber had to be included in the vegetable training and demonstration program.

The consultant was also involved in negotiations regarding the transfer of the ASSP fruit nursery and orchard situated in Madyan, Swat to the Malakand Fruit and Vegetable Development Project, Saidu Sharif, Swat.

Biological studies conducted in wire-gauze cages measuring 120cm x 120cm x 120 cm. Flowers of *Brassica campestris* var. *sarson* (mustard) and *B. oleracea* var. *botrytis* (cauliflower) were provided, as twigs dipped in water contained in glass jars, for feeding adults and potted cauliflower plants for oviposition. The plants on which eggs were laid were removed from the cages and kept in the laboratory.

RESULTS AND DISCUSSION

Distribution and Phenology

P. brassicae occurs in Pakistan at an altitude of 200m--2000m and is widely distributed in Sialkot, Rawalpindi, Peshawar,Quetta and Abbottabad. Eggs and young larvae were, however, found once at Multan(125m) in February.The climatic data of the representative localities from where it was collected are given in Table 1.

In the plains *P. brassicae* was found from January to June, with highest infestation of 15 percent in February, at Lahore, and 55 percent in March at Sialkot, on cauliflower. In the Peshawar area (Peshawar and Charsadda) it was found from November to June, which was the active period of the pest in Mingora (Swat) also. In the foothills (Rawalpandi,Taxila, Haripur etc.) *P. brassicae* remained active almost throughout the year. Immature stages of the pest were, however, not found in July when no cruciferous plants were available in the region. Highest infestation in all these areas was during March-April. At Abbottabad and Murree immature stages of the pest were present from May to September, with maximum infestation in July. It appeared that *P. brassicae* migrated from the plains to the hills with the beginning of the summer, in May, and from the hills to the plains at the advent of winter in September. At Murree and Abbottabad, *P. brassicae* was not found, in any stage of development during winter, November to April. Its phenology was however, different at Quetta (1660 m), the pest remaining active from May to October and over-wintering in the pupal stage from November to April. Thus pupae were found over-wintering on trees and walls in winter. Fresh infestation started in May, increased during June-July, and reached a peak in August when infestation on cauliflower was 52 percent.

Biology

The biology of *P. brassicae* was studied at Rawalpindi. Mating commenced on the day of emergence or on the following day and lasted 10-15 minutes. Repeated matings were observed. Oviposition started 3 to 4 days after mating and eggs were laid in clusters, mostly on the under-side of host leaves. Occasionally, however, the eggs were deposited on the upper side of the leaves as well. The number of eggs is a cluster varied from 25 to 205.

In the laboratory at 20.512°C the development of *P. brassicae* was complete in 34-37 days. The incubation period was 5-7 (mean 5.5) days and larval and pupal periods were 13-19 (mean 15.5) and 16-21 (mean 18) days, respectively.

Host plants and Damage

Smith (1951) has listed the host plants

CONTROL OF PIERIS BRASSICAE

Table 1. Climatic data representation localities from where Pieris brassicae was collected

Ecological zone	Representation Localities	Altitude (m)	Temperature ($_0$c) Mean minimum of the coldest month	Mean maximum of the hottest month	Mean annual precipitation (mm)
Northern hills	Murree	2170	-0.7	27.0	1514
	Abbottabad	1500	0.0	35.0	1350
Western hills	Quetta	1660	-2.4	34.4	240
Swat valley	Mingora	1000	1.5	36.5	950
Foothills	Rawalpandi	500	3.2	39.7	920
Plain	Peshawar	350	4.6	40.5	344
	Sialkot	250	5.6	40.5	344
	Lahore	215	4.4	41.0	489
	Multan	125	5.5	41.4	178

of *P. brassicae*, larvae of the pest were reared on *Alliaria officinalis* by Fernando (1971) and Gonzalez (1972) reported its presence on cruciferous weeds in Chile. During the present investigation larvae of *P. brassicae* were collected from several cultivated and wild crucifers. The cultivated hosts included *Brassica oleracea* var. *botrytis* (cauliflower), var. *capitata* (cabbage), var. *gongylodes* (knolkohl), var. *acephala* (leaf-cabbage), *B. campestris* var. *sarson* (mustard), B. *napus* (turnip), *Raphanus sativus* (radish) and *Eruca sativa*. It was also found to attack an ornamental plant, *Tropacolum majus* (garden nasturtium) and a few wild plants like *Sisymbrium irio* and *Cardaria draba*. Of all these cauliflower and cabbage were the most preferred hosts, resulting in heavy losses to these crops following infestation, cauliflower and cabbage plant were often completely skeletonized to stalks and veins. In such cases, heads were mostly not formed and if formed remained very small and poor in quality. Leaves fed upon by young larvae are whitish.

The young larvae fed gregariously until they were about half-grown when they started dispersing to other leaves of the same plant and later on to adjoining plants.Two to five cauliflower plants are completely destroyed by the larvae from one egg cluster.The fully grown larvae usually leave the host plants and crawl to nearby high objects,such as trees, walls, etc.,for pupation.They may crawl 10m or more on the ground and up to 5m upward on walls or trees in search of a pupation site.

Natural Enemies

Natural enemies of *P. brassicae* in Europe have been listed by Smith (1951). Lal and Chandra (1976) recorded five larval and three pupal parasites from India while Singh et al. (1976) reported *Coccinella septempunctata* L. preying on young larvae. Some bacterial, viral and protozoan diseases of *P. brassicae* have also been reported (Sweetman 1958;

DeBach, 1964; Tanada, 1967) Battu et al., (1971) found a bacterium causing disease in caterpillars in India and Arkhipov (1976) studied the effects of *Bacillus thuringiensis* var. *galleriae* in Russia.

In Pakistan no parasite or predator has been reported on *P. brassicae* eggs.Natural enemies found on larvae and pupae are given in Table 2.

most serious pest of cruciferous vegetables especially cauliflower and cabbage,in the Sialkot area. This may have been because one of the most widely distributed and effective larval parasites, *Diadegma pierisae*, was not found in this region,while population of *P.puparum*, another very common pupal parasite of *P.brassicae*, was also low.To investigate the effect of redistribution of *D. pierisae* and

Table 2. Natural enemies of *Pieris brassicae* recorded in Pakistan

Family / Name	Stage parasitized or preyed upon	Distribution
Parasites		
Iehneumonidae		
Diadegma pierisae (Rao)	Larvae	Hills,foothills,Swat, Peshawar and Quetta.
Braconidae		
Apanteles glomeratus(L.)	Larvae	Widely distributed except Quetta
Pteromalidae		
Ptermalus puparum(L.)	Pupae	Widely distributed except Quetta
Tachinidae		
Compsilura concinnata Meign	Larvae-pupae	Swat, foothills and Quetta.
Chalcididae		
Brachymeria amphissa (Wlk.)	Pupae	Hills, foothills
B. lasus(Wlk.)	Pupae	Hills, foothills
B. femorata(Panzer)	Pupae	Hills, foothills
Predators		
Formicidae	Pupae	Foothills, Swat
Monomorium sp.		
Pathogens		
Bacillaceae		
Bacillus thuringiensis Beil	Larvae and Pupae	Foothills, Peshawar

Attempted control of *P. brassicae* through Augmentation of Local Parasite Populations.

The survey revealed that *P. brassicae* is the augmentation of *P. puparum* on the pest population, these two parasites were collected from the foothills, mass multiplied in the laboratory and released

at Sialkot.

Thus in February, 61 males and 126 females of *D. pierisae* and 3000 males and 7000 females at *P. puparum* were released in cauliflower fields in which all stages of *P. brassicae* were present. A similarly infested field, 8 km away from the release site, was monitored as control. Recovery surveys were started one week after the first release and were continued till May. *D. pierisae* was recovered in February and parasitism increased to 40 percent in May, whereas in the control it was not found (Table 3). Parasitism by *P. puparum* remained consistently higher in the test field compared to the control.

studies depict that it causes heavy losses to these vegetables in Sialkot, Peshawar, in the Quetta valley, and in the foothills.

Of its natural enemies, *P. puparum* was found to be the most abundant and widely distributed, parasitizing upto 100 percent pupae at some places. Other important parasites include *D. pierisae* and *A. glomeralus*. *Compsiluta concinnata* was found to be extremely rare, possibly, because it is polyphagous (Thompson, 1951) and has other preferred hosts.

Since major loss to cauliflower and cabbage is caused in spring when head formation is at peak and harvesting is in progress, control of this pest by pesticides is not advisable. In the present investigations, feasibility of control of *P. brassicae* through its parasites, *D. pierisae* and *P. puparum*, was attempted and found to give encouraging results. Thus, redistribution and augmentation of these two parasites drastically reduced pest populations from 102 larvae per man hour

Table 3. Effects of redistribution of *D. pierisae* and augmentation of P. puparum on *P. brassicae* at Sialkot

Month	Fields where releases were made			Control		
	No. of larvae collected per man hour	Percentage parasitism *Diadegma pierisae*	Percentage parasitism *Pteromalus puparum*	No of larvae collected per man hour	Percentage parasitism *Diadegma pierisae*	Percentage parasitism *Pteromalus puparum*
February	102	3.7	2.7	95	0	4.0
March	81	10.0	100.0	120	0	13.6
April	45	35.0	83.0	180	0	10.0
May	15	40.0	100.0*	---		

- = Cauliflower and cabbage harvested and no collection was possible.
* = Based on empty pupae.

P. brassicae causes heavy losses to crucifers in many parts of Europe, North Africa and Asia (Edwards and Heath, 1964) Ghouri, (1960) reported it as a serious pest of cruciferous vegetables, especially cauliflower and cabbage, in several parts of Pakistan. The present

in February to 15 in May. Pest population in the control field rose from 95 larvae per man hour in February to 180 in April. This indicates that redistribution and augmentation of local parasites of *P.brassicae* could help to a great extent in controlling this pest.

Further, since no parasite has been recorded from eggs and this is an empty niche, it is recommended that Trichogram evanescence Westw.(Trichogrammatidae), an egg parasite, may be introduced for trials in Pakistan.

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ABBREVIATIONS

AASP/PSA	Afghanistan Agricultural Support Project/Private Sector Agribusiness
ADT	Agricultural Demonstration and Training
AES	Agriculture Extension Supervisor
CTA	Chief Technical Advisor
DAP	Diammonium Phosphate
FAO	Food and Agriculture Organization of the United Nations
FYM	Farmyard Manure
HTDP	Horticulture Training and Demonstration Program
HVH	High Value Horticulture
IIBC	International Institute of Biological Control
IRC	International Rescue Committee
LFA	Lady Field Assistant
MCI	Mercy Corps International
MFVDP	Malakand Fruit and Vegetable Development Project
NGO	Non-Government Organization
ZS	Zonal Supervisors

VEGETABLE CROP PROFILES - DRAFT

CUCUMBER

Environmental Response. The crop responds well to growing temperatures between 25-33^0 C. Low temperatures at planting will retard seedling growth.

Cucumbers are attacked by disease if they are subjected to excessive humidity. High humidity may also effect flower production.

Soils. The crop responds well to soils with a relatively high organic matter content. Cucumber is moderately tolerant to acidity and the soil pH should be in the range of 6.0-6.8

Varieties. Two good varieties are available in Peshawar:-

Beth Alpha. A weak plant, with mixed male/female flowers. The variety is resistant to Cucumber Mosaic Virus (CMV) and Watermelon Mosaic Virus (WMV).

Miracross F1. A normal plant with predominately female flowers, some local seed may be needed to plant in the crop for pollination purposes. This variety is also CMV and WMV resistant.

Demonstration Variety: *BETH ALPHA*

Seed/Plant Requirements. Depending on the viability of the cucumber seed, 30-60 gm of seed is required per jerib, which will produce between 1,200 - 2,400 seedlings. Cucumber seed can remain viable for up to 6 years.

Sowing/Seedling Raising. To obtain a uniform germination, the seeds can be pre-germinated. The local method is by placing cucumber seed and straw in a "gunny bag", moisten the bag and put the bag in a dry warm place. The seeds should germinate within 6-10 days, depending on the ambient temperature.

The sprouted seed is then planted in the field, on ridges, at a depth of 1-2 cm. The spacing for cucumbers is 1.5 - 2 meters between the rows and 30 cm between plants.

Alternatively:- Sow non-pre-germinated seed in small pots (ice cream cartons) 5 cm diameter by 7 cm deep in a sand/compost mix in a 1:1 ratio. Four weeks after sowing,

transplant the seedlings into the field. Cucumbers for transplanting have to be handled with care as their stems crush very easily. Once the seedling stems are crushed they cannot be transplanted.

Fertilizer Application. Assuming that the soil is poor or the crop is following cereals or a root crop, incorporate 3 tons of **well rotted** FYM per jerib.

The pre-planting fertilizer application should be 1.5 bags of superphosphate and 1/2 a bag of Urea per jerib.

At the first cutting of cucumbers top dress with 1/2 bag of Urea and if available apply another 1/2 bag one month later.

Irrigation. Cucumber is a well rooted plant species, with its roots reaching to a depth of one meter. Although the species can withstand certain water shortages, to produce good yields, regular watering is required. The recommendation is a twice weekly furrow application of 20 cm water depth.

Care should be taken not to wet the foliage as leaf burn and powdery mildew can be problematic in cucumbers.



Fig. 1. Leaf burn of the cucumber leaf

Stopping. If the vines of the crop are too long, with the plant producing a lot of leaf and little fruit or fruit maturity is slow due to climatic conditions, stopping can increase the rate of fruit maturity. The ends of the vines are pinched out to encourage fruit growth instead of shoot growth.

Harvesting. Fruits should be harvested when they are a fully mature green color with a firm skin, but not when they are ripe and the color is changing to a lighter green.

From the time of flower set to the first cut is 15-18 days.
From the time of planting to the fist cut is approximately 62-72 days.

Average farm yields are between 1.5 to 2.5 tons per jerib.

TOMATO

Environmental Response. Low soil temperatures retard seedling growth and the uptake of minerals. High air temperatures + 27^0 C can induce pollen sterility and high night temperatures adversely affect flower initiation. Night temperatures of 16-20^0 C are considered adequate for most cultivars. Temperatures below 13^0 C affect pollination and fertilization.

Excessive humidity causes leaf diseases. Fruits will rarely ripen fully during dull overcast weather.

Soils. The crop favors a well drained, deep cultivated, heavily manured soil. Tomatoes are moderately tolerant to acidity and the soil pH should be in the range of 5.8-6.8.

Varieties. *Roma*, a pear shaped variety, is the predominate variety in Pakistan. Afghan farmers prefer round types, although in some areas *Roma* is grown, particularly in areas close to the Pakistan border. The only round tomato, of any quantity, in Peshawar is:

Ace 55 VF - A mid to late season determinate variety. The fruit is flat round and in immaturity is uniform green. The variety can be used for both the fresh market and processing and is resistant to Fusarium and Verticillium.

Two varieties that have been used by Afghan farmers before and could be reintroduced are:

Pearson Improved VF — A late season determinate variety. The fruit is flat round and green backed. The variety can be used for the fresh market and processing and is resistant to Fusarium and Verticillium.

Heinz 1350 VF — A mid early determinate variety. The fruit is flat round and uniform green in its immature stage. The variety can be used for both the fresh market and processing and is resistant to Fusarium and Verticillium.

DEMONSTRATION VARIETY: ***SUPER HEINZ 1370***

Seed/Plant Requirements. At a spacing of 150 cm x 30 cm, 4,400 plants are required. The seed requirement for the tomato nursery should be no more than 30 grams of seed to

III. VEGETABLE PRODUCTION IN AFGHANISTAN

Vegetable production statistics are of little meaning, as they are pre-war and therefore outdated. Apart from onions, the majority of vegetables are grouped together in a total hectare statistic. Nevertheless, the following table was compiled by the existing Food Agriculture Organization of the United Nation (FAO) seed production project in Kabul in about 1989. The table also includes recommended varieties for the individual crop species.

Table 1. VEGETABLE PRODUCTION IN AFGHANISTAN (Thousands of hectares)

Crop	Area	Varieties
Onion	7.3	Yellow Spanish, Texas Early Grano
Tomato	6.6	Pearson Improved, Heinz 1372, Ace VF, Marbi, Nolly
Carrot	3.0	Chantenay
Eggplant	2.8	Black Beauty, Pusa Purple Long
Cauliflower	0.5	Early Snowball, Snowball 16, Snowball Y, Late Snowball
Spinach	3.2	Atador
Radish	2.0	Comet
Turnip	3.5	Purple Top White Globe
Cabbage	3.0	Copenhagen Market, Golden Acre
Hot Pepper	1.2	Hungary Yellow Wax
Lettuce	0.7	Great Lakes, White Boston
Okra	0.4	Pusa Sawani, Luisiana
Watermelon	24.0	Charleston Gray, Sugar Baby, Congo, Klondike
Muskmelon	30.0	Local, Askalani, Alapuchak
Total	88.6	

The varieties recommended in Afghanistan are very similar to those recommended in Pakistan.

plant a jerib. If stored correctly, tomato seed will remain viable for 3 years.

Sowing/Planting. Seedlings for transplanting should be a standard height of between 7-9 cm. Larger plants are more difficult to transplant leading to a high percentage of transplant losses.

Tomatoes are lined out on ridges at 150 cm x 30 cm. Farmers that grow *Roma* can use a closer spacing of 60 cm x 30 cm.

If wood/sticks are in short supply, the use of determinate varieties doesn't warrant training, although staking individual plants will improve the quality of the fruit.

Fertilizer Requirements. Tomatoes have a relatively heavy demand for Phosphorous and Potassium. The use of excessive nitrogen should be avoided as the element promotes leaf and not fruit.

Initially incorporate three tons of FYM per jerib.

A base dressing of two bags of DAP is recommended and if available one bag of potassium sulphate. Potassium is important for fruit production. The FYM should give approximately 7 kg of potassium per jerib.



Fig. 2. Tomato fruit crack

Irrigation. Regular irrigation is required on a weekly basis or the fruit will crack and split. Avoid wetting the leaves. Uneven watering with calcium or potassium deficiency in the soil will lead to Blossom End Rot. Moisture stress during fruiting can cause up to a 50% decrease in yield, as the immature fruit drops prematurely.

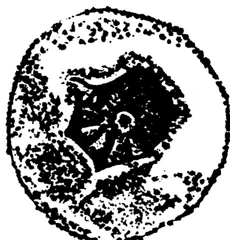


Fig. 3. Blossom end rot

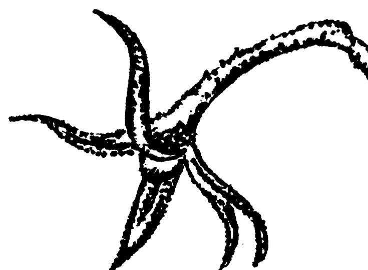


Fig. 4. Fruitlet drop
(lack of water)

Pollination. Flower set or pollination is very important. In hot weather pollination will be poor (the pollen survives for a limited time) and flower drop is common. A method to improve pollination is during the early to mid morning spray the flowers with clean water. Alternatively shake the individual flower trusses to distribute the small quantity of pollen that's available evenly.



Fig. 5.Flower drop (high temperatures)

Harvesting. Determinate varieties give fruit after 60 days. The stage at which fruits are harvested varies:

> Fruits for storage or for transporting to a distant market should be picked when they are mature green with a well rounded smooth glossy surface and a firm skin. Beware, immature fruits will not ripen properly.
>
> Fruits harvested for the local market can be picked in the pink or red stage.

Immediately after picking remove field heat.
Average farm yields vary from 1-3 tons per jerib.

GARLIC

Environmental Response. Relatively high temperatures are required for bulb formation (up to 30^0 C) but cooler conditions for vegetative growth. Planting should therefore be carried out in the warmer areas during the cooler time of the year. The more vegetative growth in the cooler period the larger the bulb size.

The crop is grown in low rainfall areas as high humidity and rainfall affects its growth.

Soils. The crop requires a fertile light soil, cultivated to a depth of 20-25 cm. Heavy soils will cause malformed bulbs. Garlic is moderately tolerant to soil acidity and the pH should be in a range of 5.5 -6.8.

Varieties. Many selections and clones are in cultivation. At present the cloves of the local varieties are very small.

French varieties are the best, such as; *Moulinin, Grulurose, Ail du Nord, Printanor, Fructidor, Rose du Var* & *Blanc de la Drome*

Varieties are classified into two morphological groups:

1. Broad leaf, large cloves, short dormancy, early maturing, but not such good keeping quality (4-5 months) *e.g Blanc de la Drome*. They have to be planted before winter solstice.

2. Narrow leaf, smaller cloves, long dormancy. Later maturity and longer keeping (7-8 months) *e.g. Fructidor*, local Pakistani and Afghan varieties are usually this group. Can be planted before or after the winter solstice.

Cloves or vegetative propagation present phytosanitary problems such as Stem and Bulb Eelworm and Whiterot. The use of hot water treatment with a water temperature of 46 C will kill nematodes in the plant tissue, if the cloves are left in the water for two hours and the water temperature remains constant.

More recently there is a greater awareness of virus diseases (Onion Yellowing and Garlic Mosaic Virus). Nearly all the garlic have inherent virus problems. Unfortunately, freeing garlic from virus would entail meristematic tissue culture in conjunction with relatively high temperatures to kill the virus particles. The process is comparatively difficult.



Fig. 6. The garlic bulb

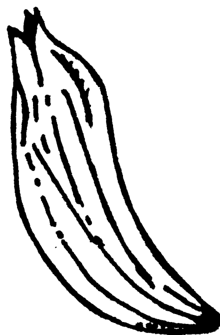


Fig. 7. The garlic clove

Seed/Plant Requirement. Garlic is propagated by cloves. The cloves are separated from the bulbs into "rounds"(individual cloves) between 140 - 200 kgs of cloves are required to plant one jerib.

Sowing/Transplanting. Garlic is commonly planted direct into the field, although more growers are planting the cloves in mini pots or cells and then transplanting the seedlings out.



Fig. 8. A garlic seedling in a plant cell

With respect to direct planting, plant the cloves into the field at a depth of 2.5 cm. Only large cloves should be planted. Large cloves produce plants that give large bulbs.

Plant in rows 30 cm apart and 10-15 cm between plants to give the optimum crop density.

If there is a wet season, plant towards the end of the wet season.

Weed Control. Garlic, like onion, is very susceptible to weed competition, especially during the first two months of growth.

The herbicide Tribunil is available in Pakistan and can be used on garlic. The product will only control broad leaved weeds. The application timing is post planting. The cloves are planted sufficiently deep, so they are not affected by the chemical.
Tribunil is applied to the bare soil directly after planting the crop.

Fertilizer Requirements Garlic responds well to FYM. At pre-planting incorporate three tons of FYM per jerib.

At final plowing apply 1/3 bag urea and two bags of super phosphate per jerib.

Six weeks after planting top dress with 1/3 bag of urea.

When the crop begins to bulb top dress with 1/3 bag of urea.

Irrigation. Irrigate immediately after planting and every 10 days thereafter. In the hotter period of the year the irrigation interval can be reduced to one week intervals.

Erratic and uncontrolled irrigation will contaminate the developing bulbs with silt and will render them unfit for export.

Harvesting. The bulbs should mature in 100-140 days. Maturity is when the leaves turn from yellow to brown and the leaves die down.

Unlike onions in which the bulbs develop at soil level, the garlic is underground and has to be dug up. Digging should take place just before the tops completely die down.

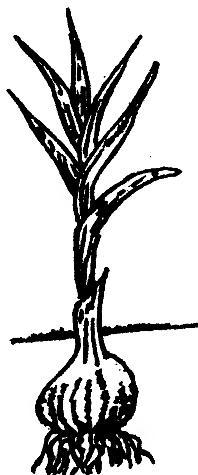


Fig. 8. Diagram to show the position of the bulb in the soil.

Curing (drying) should take place in the open under shade and will take 8 to 10 days. During curing check the bulbs for sprouting and "empty" cloves and throw them away.

Yields vary tremendously due to the time of planting and hence the length of growth of the crop. Yields per jerib will be between one to three tons.

ONIONS

Environmental Response. Although warm temperatures promote bulb development, the vegetative stage must be completed in a relatively cold period with temperatures of 18-20^0 C. The change from vegetative growth to bulb formation is stimulated by a rise in temperature. At ripening a dry period is required.

Soils. Onions require relatively high levels of organic matter in alluvial or sandy loams. Onions are slightly tolerant to acidity and grow well in soils of pH between 5.8-6.8. Stony soils should be avoided.

Varieties. Local selections of red skinned varieties (the red globe varietal type) are available. Bolters in seed bought from the bazaar are a big problem and farmers have to be careful where they get their seed. In many cases it would be better for farmers to grow their own seed.

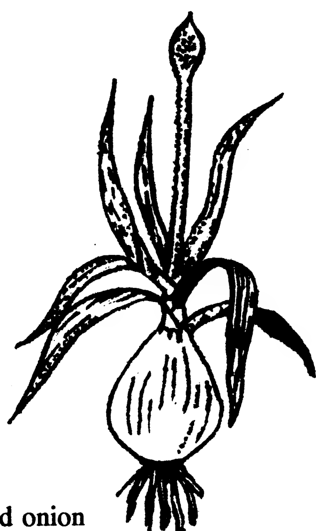


Fig. 10. A bolted onion

Seed that is produced on the farm must be given a seed treatment. It has been shown that onions grown from treated seed will store longer. Such treatments as Benlate, a seed dressing, will reduce storage rots.

If available, use Benlate T. If not, prepare 2 gm of Benlate per kg of seed and 2 gm 80% thiram per kg of seed. Put the seed and the fungicides in a sealed tin and shake.

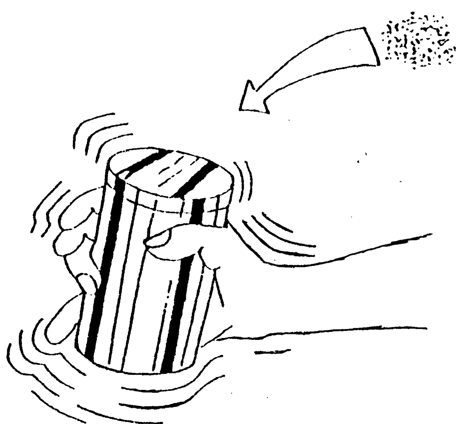


Fig. 11. "Dressing the seed" in a tin

Seed treatments of Captan and Thiram will reduce pre-emergence disease problems, but have little effect on storage rots.

Seed Requirement. An optimum planting density is 70 plants per square meter, which is 140,000 plants per jerib. For nursery sowing 550 gm of seed is required to be transplanted into one jerib.

Onion seed will only remain viable for one to two years.

Sowing/Raising Seedlings. Although it appears many farmers broadcast their seed direct into the field, the method is not to be recommended. Onions should be transplanted out of seedbeds.

The seedlings are ready for transplanting after 40-60 days from sowing, when they are between 8 - 12 cm high.

Transplant out at a spacing of 10 cm between plants and 15 - 20 cm between rows.

Weed Control. Weeds are a big problem. The crop needs to be weed free for at least during the first two months after planting. The herbicide Tribunil can be used as a post planting spray. The application timing is when the crop has 3 true leaves. Once applied, the soil must not be weeded by hand for at least six weeks, although grass weeds may appear,

as this will reduce the effectiveness of the chemical.

Fertilizer Requirements. Onions need adequate reserves of NPK, Beware of high nitrogen applications as N can delay bulb development. Phosphorous is required to promote bulb development.

Incorporate three tons FYM per jerib.

Before planting apply one bag DAP and one bag of urea per jerib.

Top dress two months after planting with one bag of urea per jerib.

Irrigation. Onions seedlings are tolerant of high rainfall. Adequate water is required at the time of bulb formation. If the rains are not prevalent, irrigate weekly by flooding the basin or furrows depending on the method of cultivation. In wetter areas onions should be grown on raised beds to avoid a high incidence of basal rots.

Harvesting. The crop is mature when the leaves discolor and bend over. The farmer should stop irrigating the crop at least two weeks before harvesting, because storage rots can be a direct result of late irrigation as well as improper drying and cutting the neck prematurely. Do not store onions that have thick necks.

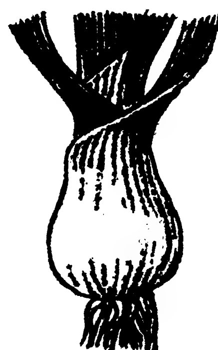


Fig. 12. A thick "necked" onion

Yields of up to 4.5 - 5.5 tons per jerib can be obtained with local varieties.

CAULIFLOWER

Environmental Response. Both low and high temperatures affect the flowering of cauliflower. In general the optimum temperature for cauliflower production is in the range of 15-20^0 C. Various conditions occur when the temperatures vary widely:

Buttoning: A curd prematurely exposed from the covering leaves caused by curd initiation before the vegetative phase has been completed, due to varieties with low leaf number about 25 (*Delta*, *Perfection* and *Alpha Climax*) and low temperatures which retard growth. All early varieties are prone to buttoning.

Bracting: High temperatures cause the bract forming buds to initiate and small green leaves are seen in the white curd.

Riciness: High temperatures cause the extended flower stems and the curds are very loose. It happens when rapid growth follows a period of slow growth.

Pinking: When the cauliflower heads are exposed to high light intensities there is a tendency for anthocyanin to form which causes the pink discoloration of the curds.

Soils. Cauliflowers respond well to rich deep soils. They require more fertile soils than cabbage. The crop does not require as much FYM as tomatoes, onions, garlic and cucumber. Cauliflowers are only slightly tolerant to acidity and grow well in soils of pH 6.0-7.0.

Varieties. The recent introduction of new germplasm has provided farmers with varieties that will produce marketable crops in the summer months in the comparatively cooler areas. There is still not a cauliflower that will produce a good crop on the plains in summer.

A number of Erfurter varieties are available which are less sensitive to extreme heat and are adapted to the drier conditions i.e. they do not produce yellow curds. Such varieties are:

Snowball(Erfurter), *Snowdrift* (Erfurter), *Matra* (Erfurter) and *All Year Round* (Autumn Giant Type).

There is a shortage of quality cauliflower seeds. Farmers produce their own seed in the warmer areas, and because the crop is cross pollinated there is varietal impurity in the seed stocks.

3.1 The Questionnaire

A questionnaire (see Appendix II) was designed for the field staff to complete. The questionnaire was utilized to:

- o determine the level of vegetable production knowledge of the project staff; and

- o obtain simple information regarding vegetable production practices in the specific areas of the individual field officers.

The data was then put on a data base program and analyzed (see Appendix III). The following is a brief synopsis of the findings.

Onions were the most widely grown vegetable crop in the project area. The crop is considered a high value crop. Many farmers make money from onions, although the earnings from onions tends to be cyclical. One year a good income is achieved followed in the next year by poor prices and a low income.

There was quite a difference between methods of production and farming systems on the holdings that grow vegetable crops.

Some vegetables are grown by specialist vegetable growers usually around the city perimeters.

Some farmers grow vegetables as an intercrop in young orchards, while others will grow vegetables as an intercrop between other vegetable species.

Vegetables, particularly in Logar and Kandahar, are cultivated after cereals, which would be indicative of planting vegetables in soils of a lower nutritional status than would be desired. Certainly with respect to carrot production, the crop is traditionally broadcast into a wheat field after taking the straw from the field. It is a quick and easy way to produce carrots with minimal time and effort.

The marketing of vegetables in Afghanistan appears to have broken down. Apart from the production areas near the Pakistan Frontier and some provinces adjacent to Kabul City, vegetables are only grown for local consumption (home gardens) or for the local market.

Urea is the most common fertilizer in Afghanistan, with supplies of DAP in some provinces (the DAP situation should improve this season with the ASSP intervention of shipping DAP into the country). Supplies of fertilizers are very low and in some locations

Varieties can be classed according to their time of production in Europe. This grouping can be referred to areas in Afghanistan above 2,000 meters above sea level:

Early Summer group: Autumn sowing and over wintering in the juvenile stage: planted in the spring cropping late May to early July: Erfurter/*Snowball, Mechelse, Alpha, Perfection, Danish Giant.*

Summer and Early Autumn types: Sown under protection February to April; field sown April May, June and July; harvested until bad weather: *Flora Blanca, Le cerf, Australian, Italian.*

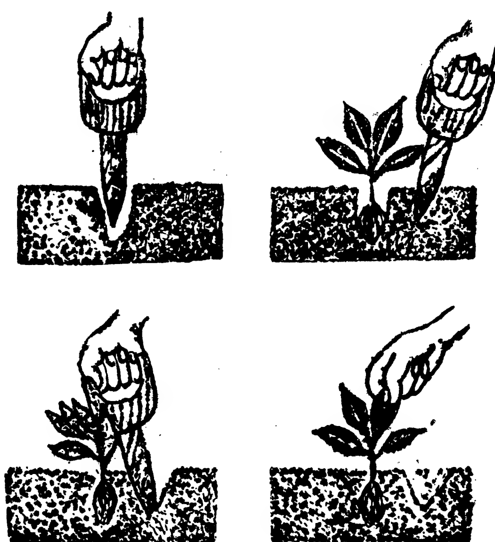
Winter and Winter Hardy types: Overwinters in mild areas, *Roscoff*; Hardier types- *Angers, English Winter* and *Walcheren.*

DEMONSTRATION VARIETY: *SNOWBALL*

Seed Requirements. Cauliflowers are raised in nurseries before being transplanted out in the field. To plant one jerib the farmer requires 5,000 seedlings which is approximately 25 gm of seed.

Planting Requirement. Cauliflowers should be transplanted either in early morning or late afternoon, avoiding the heat of the day. The correct size for transplanting a cauliflower "bare rooted" is a seedling 9-11 cm in size. Transplant the seedlings at a spacing of one meter between the rows and 60 cm between plants. The method of transplanting is as follows:

Fig. 13. Transplanting Cauliflower



- Make a hole with a fat stick or a dibber.
- Insert the plant into the hole to the depth of planting required.
- Firm the soil around the plant by making another hole next to the plant with a stick and pressuring the soil between the stick and the seedling.
- Test to see if the plants are properly transplanted. Hold a leaf between the forefinger and thumb and try to pull the plant out of the ground. The leaf should tear before it is pulled out. If not, the planting is substandard.

Fertilizer Requirements. Use an NPK base dressing and a top dressing of N when the curds begin to form. A shortage of N early on may cause "buttoning". High nitrogen levels cause "soft" plants unable to withstand frost.

Incorporate 1.5 tons of FYM per jerib.

Before planting apply one bag of DAP and one bag of urea.

Six weeks later apply one bag of urea.

Cauliflower has a high demand for Magnesium, Boron and Molybdenum, which when deficient is seen as "whiptail". It can be corrected by applications of dolomitic limestone, borax, or ammonium molybdate. Soil acidity is also linked with the availability of these elements.



Fig. 14. Whiptail

Irrigation. As a leafy shallow rooted vegetable cauliflower requires plenty of water, especially during the warmer months. Liberal watering is required and a mulch may be needed if water is short. Nevertheless over watering may cause curd decay.

As a general rule, irrigate at least two or three times a week when the temperatures rise.

Tying. In the hotter regions, in order to prevent curd discoloration, leaves are folded over and tied to prevent sun scorch.

Harvesting. Depending on the variety cauliflowers are harvested between 60 -120 days after planting out.

When harvesting the farmer should be careful not to damage the curds. Damaged curds will not stay fresh for long. After cutting remove the field heat.

Yields range from 2.5-4 tons per jerib.

CARROT

Environmental Response. The crop is sensitive to high temperatures. The optimum air temperature for growing carrots is 16-24^0 C. High soil temperatures produce stubby roots and the roots may go paler in color and turn fibrous. High soil temperatures reduce the germination of carrots.

Soils. The crop requires well drained, deep light soils. Heavy soils promote "fanging" and incidence of bacterial diseases. Fresh FYM should not be used as it also causes "fanging". The crop is moderately tolerant to acid soils and will grow in soils of pH 6.0-6.5.

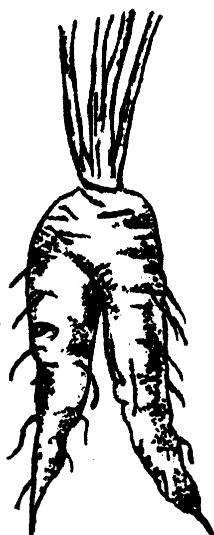


Fig. 15. A "fanged" carrot

Varieties. In Pakistan the dark rooted varieties with an annual habit are preferred. It is difficult to purchase anything but local Pakistani varieties. Like onions, unless the farmer is certain of his seed source, it is better that he produces his own seed.

The varietal group *Nantes* has been introduced to Afghanistan with mixed results. The poor results were possibly due to growing the crop in high temperatures as the roots were found to be fibrous.

DEMONSTRATION VARIETY: *CARROT PAK LOCAL*

Seed Requirement. To sow one jerib one kg of seed is required. Carrot seed will remain viable for four years.

Sowing the seed. Because the seed is sown direct into the field, a smooth well prepared seed bed is required. The soil should be cultivated to a depth of 25 cm. Although more labor intensive, sow seed in lines 30 - 40 cm apart.

If a farmer broadcasts his seed, to avoid too much seed wastage and to obtain a more even spread of seed, he should mix sand with the seed, one equal portion of sand to one equal portion of seed.

Sow at a depth of 1-2 cm. The seed will germinate in 15-20 days.

Seeds will germinate when soil temperatures are as low as 7^0 C but will take a long time. Optimum temperature for carrot seed germination is 20^0 C.

To encourage germination, mulching can be of assistance.

Seedlings should be thinned when they are about 5 cm in height, with a later thinning to get to the right planting density to allow appropriate root size.

Fertilizer Requirement. Do not apply FYM.

Before planting incorporate one bag SSP and 1/2 bag urea.

When the carrots are one centimeter in diameter and after the final thinning, top dress with 1/2 bag of urea. Beware, if the crop is top dressed earlier, excessive leaf growth and "fanging" will occur.



Fig. 16. A cracked carrot

Irrigation. Carrots are tolerant to a wide range of rainfall, but excess moisture causes reduction in root color and dry soils cause long roots and cracking.

Carrot feeder roots can reach a depth of 60 cm.

If there is insufficient rainfall before sowing, irrigate the field with 20 cm of water after sowing.

After three days, wet the soil lightly with 8-10 cm of water to encourage seed germination. Repeat every three days if the soil becomes dry.

The crop will probably need four to eight applications of 20 cm of water during the growth of the crop.

Harvesting. Roots can be harvested 70-90 days from sowing, depending on the size required and the cultivar.

During cold period carrots can be stored in the ground for a reasonable period of time.

If harvesting for the fresh market, cut the leaves off and reduce field heat after lifting. If the leaves are left on the roots, the storage potential of the carrots is poor.

Yields can be between three to five tons per jerib.

OKRA

Environmental Response. Okra grows well in dry hot climates. The plants' optimum growing temperature is 33^0 C, but they will thrive in higher temperatures.

Soils. The plant is tolerant to a wide range of soils, although the crop will yield well in rich, deep soils.

Varieties. The following varieties are being evaluated in Pakistan:

Pusa Green.
Penta Green.
T/13 (A Turnab selection.)
Rich Green.

Many varieties in the seed shops are of Indian origin. There is a widespread incidence of Yellow Vein Mosaic Virus (YVMV) among the local varieties that are grown. The demonstration variety is resistant to the virus.

DEMONSTRATION VARIETY: *PARBHANI KRANTI*

Seed Requirement. The seed rate is three kg per jerib.

Planting. The crop is direct sown into the field and the land should be well cultivated to a depth of 25 cm. The crop is usually sown on 60 cm ridges. In some areas farmers grow okra in basins.

Plant spacing is in rows of 60 cm apart, with a spacing of 30 cm between plants.

Fertilizer Requirement. Before planting apply 1/2 bag of DAP plus one bag of urea.

Six weeks to two months later apply 1/2 bag of urea.

Irrigation. The crop is well rooted and can withstand periods of relative drought. Nevertheless, drought periods will cause a reduction in yield. Regular watering is necessary at weekly intervals. If at the time of fruit swelling there is a dry period, irrigate twice weekly.

Harvesting. The first fruits are ready for harvesting in 9-10 weeks after sowing.

APPENDIX IX

The fruit should be picked young before becoming fibrous. This entails regular picking possibly, in the height of the season, once every two to three days.

Immediately after picking remove field heat. Yields of 2-2.5 tons per jerib are to be expected.

CROP ROTATION

Crop Rotation is a system whereby on a particular piece of land the crop planted changes every planting season. In vegetables rotation is important for the following three reasons:

- o It prevents the build up of a pest or disease species specific to a particular crop.
- o It reduces the number of times a farmer need apply FYM. In rotation the various crops differ in their demand for FYM. In some seasons FYM is applied. In other seasons no manure is needed.
- o Vegetable crops root at different depths, therefore the nutrients in all parts of the top soil will be utilized. Also crops with a low demand for FYM or fertilizers can follow crops with a high demand thereby utilizing the residual nutrients in the soil of the previous crop.

Below is a plan of a typical rotation:

Year/Season 1	Year/Season 2	Year/Season 3
Roots	Others	Leafs
Leafs	Roots	Others
Others	Leafs	Roots

Groups of vegetable crops to use in rotation are:

Roots. Carrot, potato, radish, turnip. Do not add manure. Requires deeper cultivated soils.

Leafs. Cauliflower, cabbage, broccoli, lettuce. Add some well rotted manure if the soil is deficient. In general, these require more irrigation water.

Others. Tomato, onion, garlic, cucurbits, chilies, beans. Add a lot of manure at cultivation. In general, these crops are not so deep rooted.

APPENDIX X



Fig. 17. A chafer grub

Chafer grubs are found in FYM. These particular pests can cause damage to the crops by eating the plant roots. At the time of mixing the manure with the soil if these grubs are seen, they should be removed and killed.

non-existent. Nevertheless, it was gratifying to know that where manure is available, vegetables are given high priority for farm yard manure (FYM).

Pesticides are in very short supply. A little over 70% of the field staff stated that pesticides were not available in their area of influence.

Local storage is practiced in many areas. The crop that is usually stored is potatoes, although other root crops have a potential for storage, in many areas they are not considered storable.

When field staff were asked what were the constraints effecting vegetable production in their areas, the following replies were received. They are ranked on a percentage basis according to the number of field officers stating a particular constraint.

Percent Ranking	Constraint
27.5	Lack of improved seed
21.5	Lack of fertilizer
14.0	No market available
11.0	No storage facilities available
10.5	Lack of pesticides
7.0	No transportation
4.5	Insufficient irrigation water
4.0	No new technology available

Lack of inputs and no market were important constraints for vegetable production. Pesticides, surprisingly, did not rank high possibly due to the early (in the war) non-availability of that particular input and farmers not being accustomed to pesticides.

When asked where do farmers get information regarding vegetable production techniques, the following ranking occurred:

Percent Ranking	Constraint
39.5	From extension personnel
26.5	From other farmers
23.0	No information
6.0	From literature and books
5.0	From the radio

FIELD COOLING

When vegetables are harvested they contain "field heat", which is the temperature of the flesh of the produce at the time of harvest.

With respect to leaf vegetables and those species that produce fruit (tomatoes), it is essential that this heat be removed, or at least reduced, as soon as possible after harvest.

Reduction of field heat must begin within one hour of harvesting.

Reduction of field heat is important as it will make the vegetables stay fresh longer. If the farmer is marketing his produce in a distant market, he needs to be aware of the principles of field heat. The reduction of field heat will help the farmer obtain a better price in the market, as his produce will still look fresh on arrival at the market.

Methods to reduce field heat are as follows:

- o Once harvested the crop must be placed in the shade. Shade could be under a tree, below the crop or in a house/shed.
- o Shelter the produce out of the way of drying winds.
- o The harvested produce should have a damp cloth to cover it. The cloth has a cooling effect on the leaves and fruit.
- o Where there are mountain streams, place the produce in containers in the water.

The cooling will slow down the maturing process of crops.

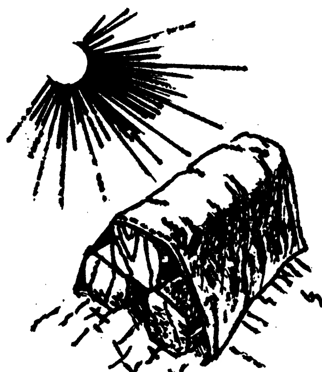


Fig. 18. Containers covered by wet cloth to remove field heat

VEGETABLE SEED PRODUCTION

Farmers often encounter the problem of obtaining good seed, in particular for onions and carrots. Unless the farmer is aware of the seed source he could buy bad seed that results in:

- o Seed that fails to germinate.
- o The crop flowers without producing a bulb, a leaf or a root.
- o Diseased seed.

Often it would be advisable for the farmer to produce his own onion and carrot seed, as improved seed is not available in the bazaar.

The farmer must select his plant material well. Selecting good, well formed and healthy onion bulbs and carrot roots are the key to successful seed production.

Onion Seed Production.

Two methods exist:

- o **Seed to seed:** The plants have to reach a sufficient size before vernalization. They need to be small plants sown in the late summer early autumn. The seed rate is 2-2.5 kg of seed per jerib in 70-100 cm rows. The disadvantage of this method is that the farmer cannot examine the bulbs for quality.
- o **Bulb to seed:** When onion leaves begin to dry, the farmer should put aside the best bulbs for seed production. The best bulbs or mother bulbs are planted in lines 70-100 cm apart. The agronomy is the same as growing a main crop of onions. **The bulb to seed method is recommended for the Afghan farmer.**

The vernalization requirement for bulbs grown in the tropics is lower than temperate climate grown bulbs. To flower, bulbs need to receive sufficient natural field cold stimulus or they need to be stored at temperatures between 7-12^0 C, if the ambient field temperature is not sufficient.

Usually in the winter months in the lowlands in Afghanistan there is a sufficient period of cold for the mother bulbs to produce flower heads.

Too much nitrogen will affect seed stalk height which in turn causes lodging. Reduce the quantity of nitrogen applied. Top dressing of the onion seed crop is not necessary.

The flowers are pollinated by insects, bees and flies. The minimum isolation between another onion seed crop is 1000 meters.

Bulb to seed roguing.

Roguing is a process of removing bad looking, diseased and not true to type individuals in a crop. Roguing should be carried out at the following stages of development of the crop:

- Before bulb maturity: Remove off types, plants bolting (flowering) in the first year and late maturing individuals.
- When sorting lifted bulbs: Check bulb shape, color and relative size. Discard early bolters and thick necks, bottle shaped bulbs, splits, doubles or damaged bulbs.
- At replanting: Check the characters mentioned above and discard any early sprouting bulbs.
- At start of flowering: Check inflorescence and flower characters and bent heads due to Eelworm (*Ditylenchus dipsaci*).

Harvest heads when 5% of seed capsules are ripe. They are black when seen against the silvery capsule. Be careful not to wait too long because at maturity, the seed shatters readily. Dry on tarpaulins. The seeds can be separated from their capsules by rubbing or beating the seed heads.

Dry the eventual onion seed to about 12%. The best yield for open pollinated crops is 400 kg per jerib, but 200 kg is more common.

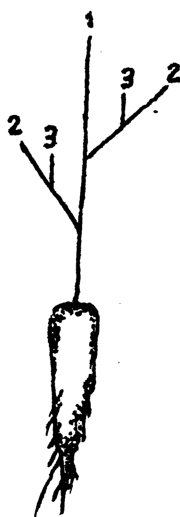
Carrot Seed Production.

The plant will generally require a cold period before it will flower. The highland areas in Afghanistan would be ideal for carrot seed production with the roots planted in the spring.

Carrots are mainly cross pollinated but because of the flowering spread on the various umbels (the various flower shoots on the flower head) self pollination occurs. Insects assist pollination.

Normal isolation is 800 meters but to be sure 1,600 meters is recommended, beware of the wild carrot or contamination will occur.

There is an order of flowering. The primary umbel, on the main stem, flowers first, then the secondary and tertiary umbels follow.



1 = Primary umbel
2 = Secondary umbel
3 = Tertiary umbel

Fig. 19. Diagram to illustrate the umbel position on a carrot flower head.

The greater the plant population the greater seed yield e.g. 20,000 and 160,000 roots will produce 140 and 480 kg of seed per jerib, respectively.

The more dense the plant spacing, the more uniform is the ripening of the seeds in the umbel and the shorter the flowering period. Less branching with more primary and secondary umbels occurs and better quality seed results.

There is a relationship between umbel position and seed quality. The seeds coming from the first umbels to mature have improved germination potential.

Two methods of seed production are "seed to seed" and "root to seed". With seed to seed the carrot roots cannot be inspected or rogued. The method relies on good seed stock and adequate isolation.

The root to seed method is better for the Afghan farmer. The method allows the farmer to inspect the carrot roots before planting.

Roguing. Remove plants showing atypical foliage. Remove bolters.

After plants have been lifted, inspect for trueness to type, according to root shape, color and size. Discard roots showing poor color, incorrect color, colored shoulders, split, "fanged" and those with rough surfaces.

Without cutting and spoiling the roots you can use a core borer to test color in the root and afterwards treat the bored hole with a fungicide powder.

The time of harvest is when the seeds in the primary umbel are ripe (brown) and starting to ripen. The seeds can be removed by beating the flower heads with a stick over a tarpaulin.

The seeds need to be dried to a moisture percentage of 10%.

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As the above information came from field staff (mainly extension agents) of the project, the data may be a little biased towards extension!

Finally, 88% of the staff questioned stated that Afghan farmers would adopt new technology, with a proviso that **such techniques were appropriate.**

3.2 The Agro-Climatic Zones

The timing of planting and harvesting of vegetables in Afghanistan is complex, as the timings vary according to the altitude, aspect and precipitation characteristics of the area in which they are grown. Before recommendations are made, regarding varieties and production timing (raising seedlings, planting or sowing and time of harvesting) agro-climatic zones have to be identified.

An agro-climatic zone is an area or region with a particular climatic characteristic, whereby a certain range of vegetables can be grown and produce crops of optimum yields during the specific times of the year.

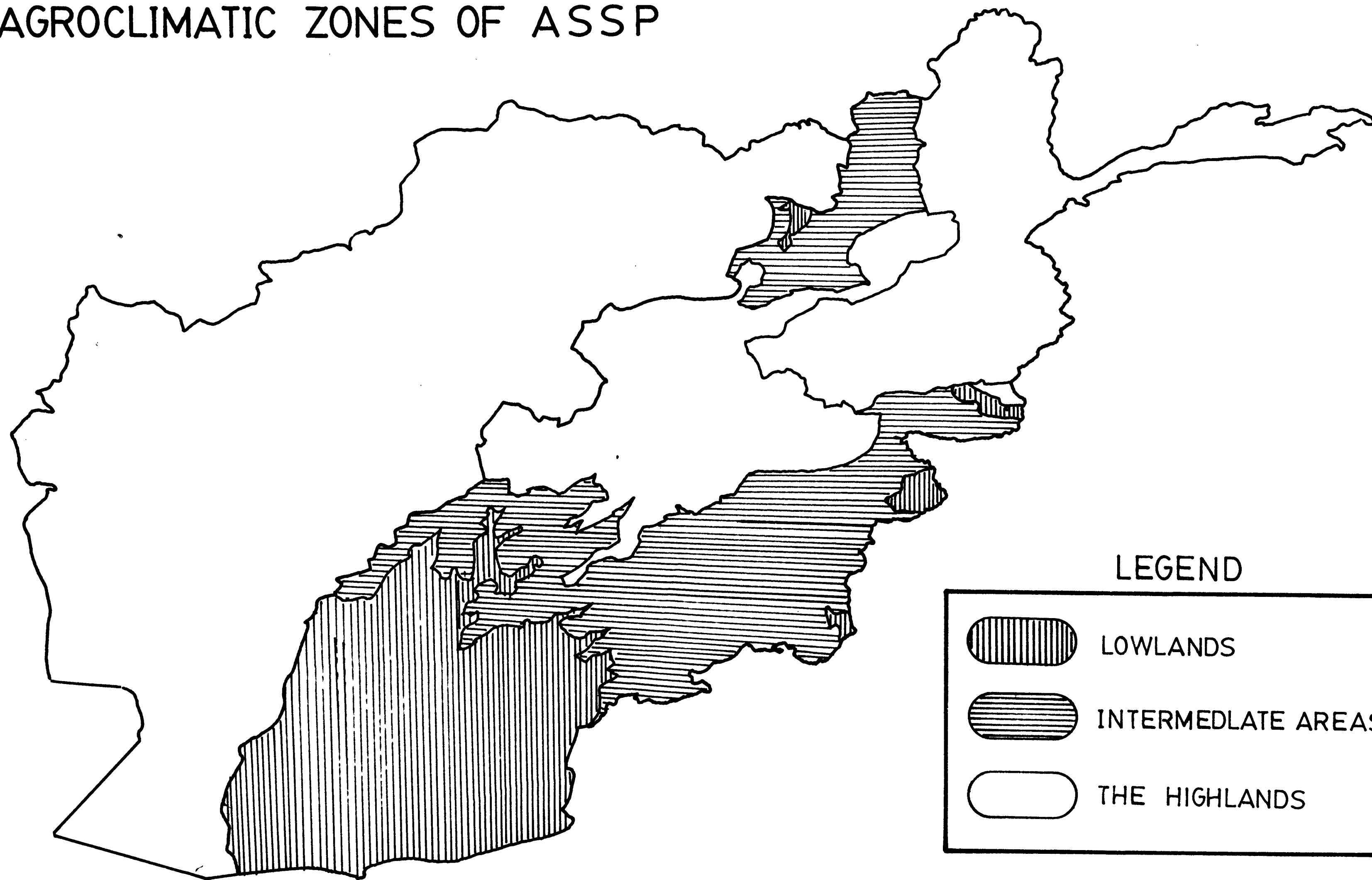
Vegetables can be grouped into summer and winter vegetables according to their ability during their various physiological stages to withstand heat and cold within the summer and winter respectively. Within the vegetable groups, there is an array of species that may be even more adaptable to hotter conditions (okra and the *Cucubitaceace*) and those that can adapt to even colder conditions (winter cabbage and winter broccoli).

From the above it is evident that the agro-climates have to be defined in Afghanistan, so as to determine in which areas and at what times individual vegetables can be planted **and** come to fruition.

Agro-climates not only influence the agronomic aspects of vegetable production but also, the timing of extension messages, the supply of inputs, the availability of machinery at peak periods and more importantly, where to market the crops to obtain a comparative advantage (hopefully achieve a better price) over other areas.

At present, in the project area, three broad based agro-climatic zones can be identified: (see map overleaf)

- **The Highlands:** Winter vegetables can be planted in April to early May and summer vegetables can be planted in mid-summer when the risk of cold nights and large fluctuations of day and night temperatures has passed. In one year two winter vegetable crops can be produced in this zone, but care is needed in choosing the second winter vegetable crop, such as cabbage or peas, with a comparative short vegetative phase.


AGROCLIMATIC ZONES OF ASSP
LEGEND
LOWLANDS
INTERMEDLATE AREAS
THE HIGHLANDS

- **Taghar/Baghlan area and the Lower Highland areas:** Because this is an earlier, warmer region, winter vegetables can be planted early to late April and summer vegetables can be planted in May. Two vegetable crops per annum can be grown in this zone one winter vegetable and one summer.

- **The Lowland areas:** In these dry hot areas summer and winter vegetables can be grown in the winter and heat resistant summer vegetables can be grown in the hot summer months.

The above agro-climatic zones are at present vague and will be refined when more information is obtained in the project area.

3.3 Vegetable Production Practices

After thirteen years of conflict, like other agricultural sectors, vegetable production in the country has diminished considerably.

Where vegetables are grown, it is a small household garden or close to the house with an average size holding of one jerib (0.2 ha). Before the war vegetables were the predominate cash crop in many areas. Now the crops are used primarily for feeding the family. Many farmers are not concerned with marketing their crops.

The agronomic practices of using improved seeds, inorganic fertilizers and applying pesticides are almost non-existent. Farmers are producing low input vegetable crops, which means FYM is used and cultural, mechanical and biological control (the latter inadvertently) measures are in force for pests and diseases.

As well as the biotic factors of poor seed and pest and diseases problems, a range of abiotic factors has contributed to not achieving optimum vegetable yields. They include soil quality (pH, degraded soils, poor textures, salinity, infertility and topography) temperatures, water supply and quality, day length and light intensity. The combinations of all the above cause limited yields and crop variability.

Good vegetable production is dependant on quality seed. Lack of good seed has possibly effected vegetable production more than anything else. In Afghanistan the seed is mainly "farm saved" and of a dubious quality. It is only farmers near the larger conurbations that have access to improved seed, albeit the supplies are still limited in the cities and towns.

Afghan farmers are largely unaware of improved technology production practices and still adhere to the traditional ways of growing vegetables, such as broadcasting the seed of carrot and onion, not watering at certain periods of the crops growth, and not removing field heat or packing produce correctly.

production facets of one particular crop.

Nowadays, a great deal more work is being carried out on vegetables in Afghanistan. There has been a proliferation of vegetable demonstration plots. The NGOs seem to be turning their attention to vegetables. Information from such demonstrations needs to be collated to provide data with respect to varieties used, planting dates, pest and diseases etc. The information can then be classified according to the agro-climatic zones in which the demonstrations are located. At this early stage any information is invaluable. It is up to the future Vegetable Coordinator to gather such information and analyze it.

The most important constraint in the improvement of vegetable production is the availability of good seed. The project could, if human resources were available, introduce carrot and onion seed production to farmers. These two crops have no improved varieties in the bazaar and farmers are obliged to purchase seed of dubious origin. As a seed crop, carrots and onions are relatively easy to produce. In conjunction with this recommendation, it is suggested that the AESs should attend a vegetable seed production course at the Vegetable Seed Farm Quetta.

A limited quantity of equipment for procurement is recommended:

- Each extension agent should have a pocket knife, a hand lens (x 10 magnification) and a trowel.
- AESs should have in their possession an altimeter as well as the above mentioned articles for extension agents.

It is recommended that the project import bulbs of one broad leaf and one narrow leaf variety of garlic, small quantities of tomato and carrot seed of the varieties used in the harsher conditions of the North of Mexico, and a relatively heat tolerant cauliflower from Taiwan.

Long Term Strategies

Owing to the size of the project area and the relative importance of vegetables, it would be advisable, in the long term, to recruit two Vegetable Coordinators. One coordinator would be assigned to the hotter lowlands and the other to the cooler highlands. With the eventual introduction of a greater range of varieties, inputs and improved techniques, cropping in the two aforementioned climate areas will become distinct and would require individual coordinators.

Low input horticulture should continue to be encouraged. The farmers are at present producing vegetables with few or no inputs. They should be persuaded to continue producing vegetables without relying on pesticides. The growers should adopt the integrated approach for pest and disease control with the minimal use of inorganic fertilizers. The emphasis should be on sustainable agricultural systems.

Work is needed to identify biological systems for pest and disease control. The International Institute of Biological Control (IIBC), Rawalpindi, should be contracted to research into such integrated pest management systems. Already, within Pakistan, the institute is involved in a number of biological control projects.

Women play a role in vegetable production, particularly with respect to household gardens. They require training. The majority of women of the Eastern provinces are in refugee camps. Programs for training women either through male intermediaries of the households or Pakistani Lady Field Assistants need to be evolved. Although the project is concerned with the interior of Afghanistan, it must not be forgotten that a large part of the target population is still living in the refugee camps along the Afghan border. Refugee camps are ideal for achieving effective extension penetration.

For greater extension penetration of the rural population, the feasibility of utilizing farmer groups as a form of extension should be investigated. The existing project field staff could be complemented by part time farmer extension agents nominated by the individual farmer groups. Through such farmer groups, inputs could be supplied gratis to the nominee, in payment for his time given for training and extension purposes. In times of food shortages, the farmer extensionist may be the contact for the distribution of supplies.

There would be a need for the overseas training of the Vegetable Coordinators, in order to upgrade their technical capability. A possible location would be the Asian Vegetable Research and Development Training Center, which is located at Kasetsart University, Thailand.

It is recommended that the second part of this particular consultancy coincide with the AES visit in Pakistan, during the month of August. At that time, further training and field trips can be given to them and the Autumn/Winter Demonstration Program can be planned and implemented.

VEGETABLE PROGRAM

March 1992



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Development Alternatives, Inc., 74E Ajaib & Sons Plaza, Blue Area, Islamabad, Pakistan

VEGETABLE PROGRAM

March 1992

Prepared For:

OFFICE OF THE AID REPRESENTATIVE FOR AFGHANISTAN (O/AID/REP)

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AFGHANISTAN AGRICULTURAL SECTOR SUPPORT PROJECT/PRIVATE SECTOR AGRIBUSINESS (ASSP/PSA)
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APPENDIXES

EXECUTIVE SUMMARY

The consultant was in country between February 28 and March 27, 1992.

The main objective of the consultancy was to introduce a vegetable production, demonstration and training component into the Agricultural Development and Training (ADT) sector of the Afghanistan Agricultural Sector Support Project/Private Sector Agribusiness (AASSP/PSA).

The methodology of achieving the objective was by:-

- Training the field staff for the last week of their three month training course. During the week's training, a field trip was organized to give the trainees an insight into the practical aspects of vegetable production.

- Technical training material has been left with the project for its partial translation into Farsi.

A Spring/Summer vegetable demonstration program has been devised. The total number of demonstrations will be 117, covering the 11 provinces where the project has field representation. The demonstrations have been planned in such a way that they cover the various agro-climatic zones that exist within the individual provinces.

For the augmentation of vegetable production in Afghanistan and for the vegetable component to be effective and viable, a number of strategies are recommended both in the short and long term.

Short Term Strategies

In Afghanistan, the vegetable production systems are complicated by the agro-climatic diversity of the country. The Area Extension Supervisors (AES) cannot be expected to run a vegetable program as well as perform their numerous other duties effectively. There is a need to recruit an Afghan Vegetable Coordinator, to support the AES in his task, through the Zonal Supervisors (ZS).

In conjunction with the Vegetable Coordinator, it is recommended that vegetable field agents be recruited to identify and support the Target Vegetable Extension Pilot Areas.

Target vegetable extension pilot areas within the project area should be identified. With the project's present staffing levels, the promotion of vegetable production throughout the entire area is impossible. The promotion of vegetables should be confined to areas that show or have potential for vegetable production.

Demonstration plots should be kept simple, demonstrating one or possibly two